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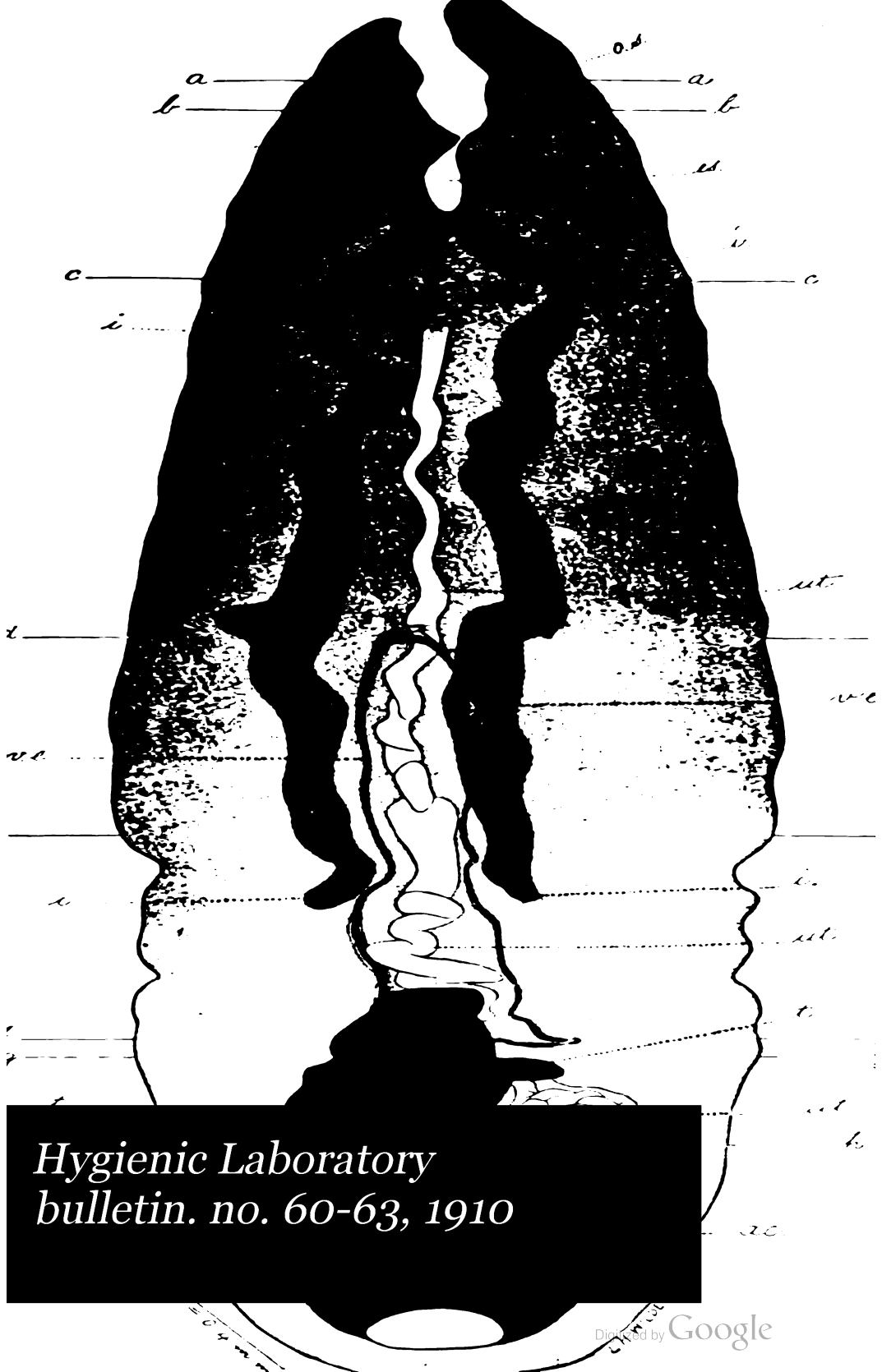
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TREASURY DEPARTMENT
Public Health and Marine-Hospital Service of the United States

HYGIENIC LABORATORY.—BULLETIN No. 60

April, 1910

A STUDY OF THE ANATOMY OF WATSONIUS
(n. g.) WATSONI OF MAN

AND OF

NINETEEN ALLIED SPECIES OF MAMMALIAN TREMATODE
WORMS OF THE SUPERFAMILY PARAMPHISTOMOIDEA

.....

By

CH. WARDELL STILES
and
JOSEPH GOLDBERGER



WASHINGTON
GOVERNMENT PRINTING OFFICE
1910
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A STUDY OF THE ANATOMY OF WATSONIUS (n. g.) WATSONI OF MAN,

AND OF NINETEEN ALLIED SPECIES OF MAMMALIAN TREMATODE
WORMS OF THE SUPERFAMILY PARAMPHISTOMOIDEA.^a

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and JOSEPH GOLDBERGER,

Passed Assistant Surgeon, United States Public Health and Marine-Hospital Service.

SUMMARY.

The present paper contains the results of an anatomical study of one parasite of man (*Watsonius watsoni*) and comparison with 19 other closely related trematodes, part of which were sent to us for determination.

Watsonius watsoni, originally classified as *Amphistoma*, later as *Cladorchis*, represents the type of a new genus. Its testes are one caudad of the other, instead of side by side, as heretofore interpreted.

The families *Paramphistomidae* and *Fasciolidae* should be raised to superfamilies as *Paramphistomoidea* and *Fascioloidea*. *Paramphistomoidea* contains three families, *Gastrothylacidae*, *Paramphistomidae*, and *Gastrodiscidae*.

These families may be divided into various subfamilies, genera, and subgenera, as shown in the table of contents (pp. 5-6) and in the various keys (pp. 15, 16, 50, 61, 62, 63, 74, 131, 173, 247, 249).

Anatomically, the group in question is very interesting, but a careful study of any given species is exceedingly tedious because of the thickness of the specimens. The projection method was found to be the most satisfactory in preparing drawings to illustrate the topography.

Of rather special interest is the perisuctorial cavity, which may be very large in some species. Dorsal and ventral mesenterium-like bands traverse this cavity, binding the oral sucker to the body parenchyma. The structure in question is strongly suggestive of a rudimentary body cavity, the absence of which is characteristic for the group of Flat Worms, to which these parasites belong.

We have been fortunate in having for study some of Cobbold's original material of *Amphistoma stanleyi* and *A. collinsii*, with the result that we accept *Pseudodiscus* as a valid genus. Anatomically, the fact is important that these species show a very complicated structure of the oral sucker and its pouches, the latter being separated from the former by intermediate bulbs.

Summaries of the separate groups may be found in the respective diagnoses and keys.

^a Submitted for publication September 23, 1909.

INTRODUCTION.

Among the parasites recently sent to this laboratory for determination have been several species of amphistomes, which prove to be new to science. In studying them it has been found necessary to compare certain known forms especially the so-called *Cladorchis watsoni* of man. Fortunately for this work, we have had at our disposal some of Cobbold's original material of species of the little-known genus *Pseudodiscus* and one series of sections of the original material of *Cladorchis watsoni*.

The study has resulted in certain changes in classification and the proposition of several new genera and subgenera.

TAUTONYMY IN GENOTYPES.

One of us (Stiles) has upon several former occasions expressed the view that in the case of genotypes absolute or virtual tautonymy is exceedingly desirable. In accordance with this view we have, whenever the occasion presented itself, purposely formed the names so that either virtual or absolute tautonymy results. A consistent application of this principle would do much to reduce confusion in classification.

BIBLIOGRAPHIC REFERENCES.

Bibliographic references and systematic names of parasites refer to the citations given in Stiles & Hassall's Index Catalogue of Medical and Veterinary Zoology (Authors, Bull. 39, United States Bureau of Animal Industry; Trematoda, Bull. 37, Hygienic Laboratory, United States Public Health and Marine-Hospital Service).

TERMINOLOGY.

As some of the technical terms used in this paper are not in common use in helminthology, it may be well to give a few words of explanation in regard to them.

Oral sucker and pharynx.—The initial suckorial organ of the digestive tract of trematodes is usually named the "oral sucker," while the term "pharynx" is reserved for an organ of less constant nature which develops in the esophagus. In recent amphistome literature the term "pharynx" has been substituted by authors for the

"oral sucker" of the amphistomes. We agree with Looss that this substitution does not appear to be well founded and we therefore revert to the term "oral sucker."

Acetabulum.—The term "acetabulum" is reserved exclusively for the "caudal sucker," homologous with the "ventral sucker (acetabulum)" of the distomes.

Evaginations of oral sucker.—This is a general term used to designate any kind of an evagination from the lumen of the oral sucker; the evagination may be paired or circular.

Bulbs and pouches.—As these terms are used in this bulletin, a "pouch" is a cecal evagination, regardless of its histological structure or position relative to the sucker. In some species (as in *Pseudodiscus*) the pouch is separated from the sucker by a "bulb" namely, not a cecal structure.

The pouches vary somewhat in histological structure in different species. The walls usually present a loose mesh or parenchyma-like texture with few if any muscular elements; in some cases the mesh-work appears more or less condensed, approaching the structure of the oral sucker as the latter occurs in *Homalogaster philippinensis* and *Watsonius watsoni*.

The bulbs agree with the oral sucker histologically, whether the latter be dense or loose in structure.

Testes and testicles.—We favor the use of the term "testis" and "testes" for the two male glands of the trematodes; if these glands are divided, as in *Pleorchis* or as in the cestodes, the subdivisions may well be called "testicles."

Genital pore.—The genital pore is the opening which leads from the external (ventro-median) surface of the worm into the genital atrium.

Genital atrium.—This is the cavity or depression into which the genital papilla projects. Its dimensions vary greatly in the different forms in which it occurs. In some it is partly divided into a ventral and a dorsal chamber by a more or less sharply developed projecting ring.

Porus hermaphroditicus.—The external opening of the ductus hermaphroditicus is the hermaphroditic pore and usually discharges into a genital atrium.

Topographic terms.—In a paper now in course of preparation, one of us (Stiles) is proposing a departure in the topographic terminology of the trematodes, and some of the terms are used in this bulletin. In brief, longitudinal and transverse straight lines are drawn at the periphery of the various organs; the longitudinal lines bound fields, the transverse lines bound zones. Portions of the body bounded by other than straight lines (as that portion bounded by the intestinal ceca) are termed "areas." Organs are then located with reference to these fields, zones, and areas. Thus, the testicular zones may

coincide, overlap, abut, or be separate; the testicular fields may coincide, overlap, abut, or be separate. An ovary may be described as in the pretesticular, testicular, or posttesticular zone, or in the extratesticular, testicular, or intertesticular field; a given organ may be in the prebifurcal zone, preacetabular zone, postacetabular, postovarial, postuterine zone, etc. The body is also divided into five transverse zones, each representing 20 per cent of the body length; these zones, beginning at the oral pole, are called the first, second, third, fourth, and fifth. It is believed that by aid of this system, descriptions may be made more exact than they frequently are at present, and that, especially in the case of tabular keys, the system will be found useful. A key to the figured species of distomes is now being formed on this principle; a preliminary study, based upon about 150 illustrations, has thus far been found to be very satisfactory.

SUPERGENERIC SYSTEMATIC UNITS.

During recent years, especially since 1898, the tendency in helminthology has been to raise species to generic rank, and genera to subfamily or even to family rank. In this tendency, helminthology has simply followed in the wake of other specialties in zoology. If in continuing this tendency we fail to recognize certain other systematic units, such as the superfamily (ending in *oidea*), and tribes and subtribes (ending in *idi* and *ini*), the danger is present that natural groups will be separated, units coordinate in rank will not be coordinate in actual value, and the classification will become confused.

It is true that the superfamily and the tribes and subtribes have not yet been recognized in the International Code, but they have been used by so many authors that they can be looked upon as recognized units. We here recognize the superfamily as standing between the suborder and the family, and we adopt for it the ending (*oidea*) proposed by Gill. The tribe (ending *idi*) and the subtribe (ending *ini*) we recognize as standing between the subfamily and the genus.

It would seem to us wise to raise the former trematode families *Fasciolidæ* and *Paramphistomidæ* to superfamily rank *Fascioloidea* and *Paramphistomoidea*, in order to leave room for expansion of systematic units made advisable because of recent changes in taxonomic conceptions in these groups. The present paper deals entirely with the *Paramphistomoidea*.

TECHNIQUE.

The material which forms the basis of this paper consisted, in the main, either of specimens sent to us for determination or of preserved specimens forming a part of the helminthological collection of the United States National Museum. Some of this latter material was

quite old, dating back as far as 1875 (*Ps. stanleyii*), but was remarkably well preserved. In the beginning of this work, after studying the external characters of the individuals of a species, we made "toto" mounts of stained and cleared specimens and a series of transverse and, if sufficient material was available, of sagittal and frontal sections. The general topography of the internal characters could more or less clearly be made out from the "toto" mounts and this would be corrected or amplified by a study of the serial sections. This method of procedure is obviously only applicable where several individuals, at least two, of one form are available for the study of the internal anatomy. Inasmuch as some of our most valuable material consisted of forms comprising not more than two individuals and only one of these was available for such study, the following method of procedure was devised by one of us (Goldberger) and applied with exceedingly satisfactory results. The external characters of the specimen selected were first carefully noted and then such drawings made as seemed desirable. These always included one of the ventral and another of the profile aspect, the outlines being made with the aid of the camera lucida. The specimen was next stained. We have used both carmine (para-carmine, carmalum, acetic acid alum-carmine) with and without counterstain (picric acid) and Mayer's hæmalum, but on the whole the carmine stains without counter stain gave us the most satisfactory pictures. After staining we dehydrated with alcohol and cleared in xylol. The cleared specimen was now examined under the microscope and drawings and notes made of such points in the internal topography as could be made out. After this the specimen was infiltrated and embedded in paraffin of a melting point of 54° C., careful note being taken of the orientation; this was always such as to give transverse sections at right angles to the median sagittal plane of the worm. Depending on the size of the worm the sections were cut at either 10 μ or 20 μ . In this connection it may perhaps be mentioned that, as has been repeatedly observed by one of us (Goldberger), the most favorable temperature for obtaining good ribbons of sections of this thickness is between 27° and 29° C.

The next step is the reconstruction of the worm from measurements of the sections with the ocular micrometer. The reconstruction is by projection on paper of a series of significant points at selected levels in either a ventral or a sagittal view. The base line in the former case may be one of the lateral margins, or, more simply and equally satisfactorily, the median sagittal plane (represented as the median longitudinal axis); in the case of the sagittal projection the profile line of the dorsum is used as the base line. The projected points belonging to the various organs are connected by lines which give, in effect, the outline, on a suitable scale, of the projected shadow of the body of the worm and of the organs or systems of organs. A

convenient scale is 50 for sections of 20μ and 100 for those of 10μ in thickness. On this scale each section is represented in projection as 1 mm. thick, and consequently the frontal apparent length of the worm would be represented as equal to the total number of the sections in millimeters. Given a satisfactory series of sections, this method enables one to work out the topography of the organs or systems of organs with a high degree of precision. It must be said, however, that it is also very tedious and time consuming. Our figures 1, 2, 23, 24, 45, 46, 61, 62, 72, 73, 83, 84, 94, 95, 105, 106, 139, 140, 192, and 193 were constructed in this way.

PARAMPHISTOMOIDEA, new superfamily.

SUPERFAMILY DIAGNOSIS.—*Trematoda*, *Malacocotylea*, *Digenea*: Acetabulum caudo-terminal, subterminal, or ventral close to caudal end. Oral sucker and esophagus present, ceca 2. Hermaphroditic. Genital pore ventro-median, preequatorial, pretesticular, preovarial.

Male organs: Testes 1 or 2, usually preovarial.

Female organs: Vitellaria paired.

TYPE FAMILY.—*Paramphistomidae*.

This superfamily is practically *Paramphistomidae* Fischœder. It should, we believe, be divided into three families, as follows:

KEY TO FAMILIES OF PARAMPHISTOMOIDEA.

- A¹. Body discoidal; divided into an anterior (cephalic) and a posterior (caudal) portion; venter with many, large papillæ; acetabulum ventral, at caudal end; ventral pouch absent *Gastrodiscidae*, p. 249.
- A². Body not discoidal, not divided, venter not provided with many large papillæ:
 - B¹. Ventral pouch present *Gastrothylacidae*, p. 15.
 - B². Ventral pouch absent *Paramphistomidae*, p. 60.

GASTROTHYLACIDÆ, new family.

FAMILY DIAGNOSIS.—*Paramphistomoidea* (p. 15): Ventral pouch present.

TYPE GENUS.—*Gastrothylax* Poirier, 1883.

This group has heretofore been considered a genus in the family *Paramphistomidae*, subfamily *Paramphistominæ*, but the presence of a ventral pouch separates it so radically from the other forms that distinct family rank seems justified. The typical, and thus far the only, subfamily *Gastrothylacinæ*, contains 13 species, which may be divided at present into 4 more or less natural groups. At least one of these groups (type *gregarius*) will doubtless soon require further subdivision. The question as to whether these groups should at present be given generic or subgeneric rank is one upon which there may be a very legitimate difference of opinion, but we believe that the entire tendency of the present day, wise or unwise as it may eventually prove to be, is to consider the differences in question as generic, and in the present paper we shall so regard them.

GASTROTHYLACINÆ, new subfamily.

SUBFAMILY DIAGNOSIS.—*Gastrothylacidae* (p. 15): Body elongate, venter straight to concave, dorsum convex, cephalic end attenuate, rather pointed, straight, may curve slightly dorsad, caudal end slightly attenuate to rounded, usually slightly constricted immediately preacetabular, in transverse section more or less circular but form influenced by pouch. Ventral pouch opens slightly postoral, extending nearly or quite to acetabulum. Acetabulum relatively small, terminal to ventro-subterminal, slightly sunken, margin not raised. Genital pore without sucker. Excretory pore postvesicular or nearly so, in acetabular zone, caudad of pore of Laurer's canal. Oral sucker without evagination; esophagus without muscular thickening; ceca narrow, wavy or not wavy, long or short, end postequatorial.

Male organs: Testes 2, considerably smaller than acetabulum, coarsely lobate, rarely postovarial, chiefly preovarial, postequatorial, not widely separated from acetabulum; muscosa never enormous; cirrus-pouch absent.

Female organs: Ovary and shell-gland in testicular or posttesticular zone, never pretesticular; vitellaria extend from oral sucker to acetabulum, nearer ventral pouch than body wall, more ventral than dorsal, follicles in small groups; Laurer's canal anatomically prevesicular, but because of curve may lie partly in vesicular zone; uterus of 2 types (see genera).

Eggs: Operculated (at least in some forms).

TYPE GENUS.—*Gastrothylax* Poirier, 1883.

The four genera here recognized for the subfamily *Gastrothylacinæ* may be distinguished by the following key:

KEY TO GENERA OF GASTROTHYLACIDÆ, GASTROTHYLACINÆ.

- A¹. Vas deferens and cephalic half of uterus in separate, right and left, largely extra-suctorial fields; uterus crosses to other side near equator of body; testicular fields separate, zones coincide; type *crumenifer*..... *Gastrothylax*, p. 16.
- A². Vas deferens and cephalic half of uterus chiefly or entirely in suctorial field:
 - B¹. Testicular fields separate (lateral), zones coincide:
 - C¹. Vesicula seminalis with a straight and a coiled portion; testes in inter, extra, and cecal areas; type *wellmani*..... *Wellmanius*,^a p. 51.
 - C². Vesicula seminalis without straight portion; testes inter or postcecal; type *gregarius*..... *Carmyerius*, p. 50.
 - B². Testicular fields coincide or overlap (median), zones coincide or overlap; type *elongatus*..... *Fischerdierius*, p. 17.

GASTROTHYLAX Poirier, 1883.

GENERIC DIAGNOSIS.—*Gastrothylacinæ* (p. 16): Vas deferens and cephalic half of uterus in separate right and left, largely extrasuctorial fields, uterus crosses to other side near equator of body. Testicular fields separate, zones coincide and, chiefly, postcecal; ovary in intertesticular field. Cross section of ventral pouch triangular, with apex dorsad, base ventrad. Ceca end preovarian, preacetabular, in fourth zone, not wavy.

TYPE.—*G. crumenifer* (Creplin, 1847).

This genus is apparently Asiatic, and at present contains two species, which can be easily distinguished by the following key:

Ceca end pretesticular; body 9 to 11 mm. long; type host *Bos indicus*. [Probably from Asia]..... *G. compressus* Brandes, 1898.

^a In general we prefer masculine endings in zoological generic names.

Ceca end in testicular zone; body 9 to 18 mm. long; type host *Bos indicus*, Asia; also in *Bos kerabau*, Ceylon.....*G. crumenifer* (Creplin, 1847).

FISCHÆDERIUS, new genus.

GENERIC DIAGNOSIS.—*Gastrothylacinae* (p. 16); Vas deferens and cephalic half of uterus chiefly or entirely in suckorial field. Testicular fields median, coincide or overlap, zones coincide or overlap, one testis more dorsal than the other, inter or postcecal; vesicula without straight portion. Ventral pouch divides body into 3 longitudinal body segments, a dorsal segment containing uterus, and 2 ventro-lateral segments.

TYPE SPECIES.—*F. fischæderi*. Asiatic.

This genus, which we dedicate to Fischæder (the well-known author who has done so much to advance our knowledge of the mammalian amphistomes), contains four very closely allied species, which may be distinguished by the following key:

- a¹ Ceca end posttesticular, postovarian, in acetabular and fourth zone; testicular fields overlap, zones nearly coincide; body 8 to 10 mm. long; type host *Palonia frontalis*, Java.....*F. cobboldii* (Poirier, 1883).
- a² Ceca end pretesticular, preovarian, preacetabular:
 - b¹ Genital pore on vertex of prominent hemispherical bulging; testicular fields and zones overlap:
 - c¹ Ceca end in third zone; ovary and shell gland not intertesticular; body 10 to 20 mm. long; type host "*Palonia*" *frontalis*, Java; also in *Bos kerabau* in China, and *Anoa depressicornis*.....*F. elongatus* (Poirier, 1883).
 - c² Ceca end in fourth zone; ovary and shell gland intertesticular; body 6.4 mm. long; type host *Bos kerabau*, Ceylon.....*F. fischæderi*, p. 17.
 - b² Genital pore not on vertex of prominent hemispherical bulging; ceca end in third zone:
 - c³ Testicular zones overlap; ventral pouch not continued posttesticular; body 6.6 to 15.5 mm. long; type host *Bos* sp., Siam.....*F. siamensis*, p. 28.
 - c⁴ Testicular zones coincide; ventral pouch continued posttesticular; body 6 to 7 mm. long; type host *Bos kerabau*, probably from Asiatic region.
 - F. ceylonensis*, p. 39.

FISCHÆDERIUS FISCHÆDERI, new species.

[Figs. 1 to 10.]

SPECIFIC DIAGNOSIS.—*Fischæderius* (p. 17): Body 6.4 mm. long, 2 mm. broad, 2 mm. thick; buff color (alcohol specimen); rather conical, greatest transverse diameter near equator, greatest dorso-ventral diameter in caudal third; attenuated cephalad, and very slightly caudad; longitudinal axis somewhat curved, concavity ventrad; cephalic extremity bluntly pointed; caudal extremity blunt; dorsum convex longitudinally; venter slightly concave longitudinally; transverse sections nearly circular, but tending toward a bluntly rounded triangle, with apex ventrad, especially in equatorial region. Surface smooth except for a few blunt papillæ in cephalic region and on lip of aperture of ventral pouch. Opening of ventral pouch 0.5 millimeter from cephalic margin; pouch begins with a narrow neck, which at the genital pore widens into a large cavity, extending dorsally to near genital glands, ventrally slightly farther; transverse section of aperture and neck crescentic, of the cavity rather triangular with apex ventrad. Genital pore seemingly very slightly postbifurcal on a prominent bulging. Acetabulum 1.04 mm. in diameter, terminal, slightly sunken below surface of body, with 0.5 mm. aperture directed caudad but very slightly ventrad. Mouth terminal; oral sucker 0.6 mm. long, slightly larger than esophagus; perisuckorial cavity roomy;

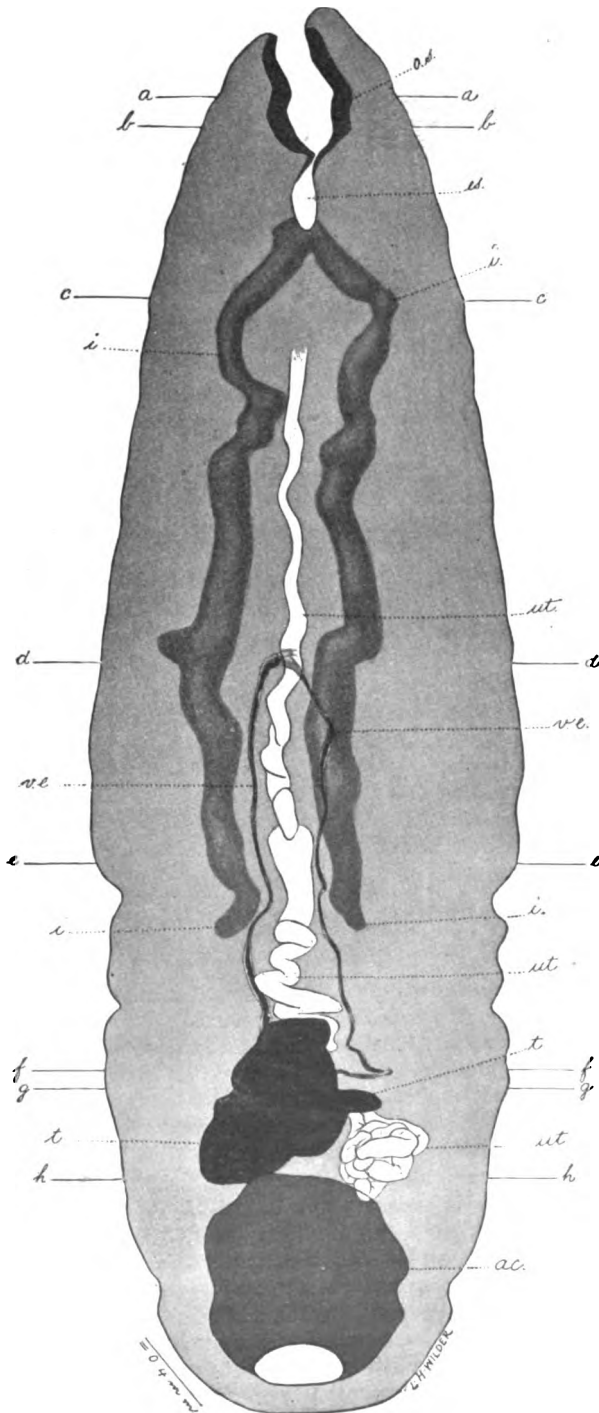


FIG. 1.

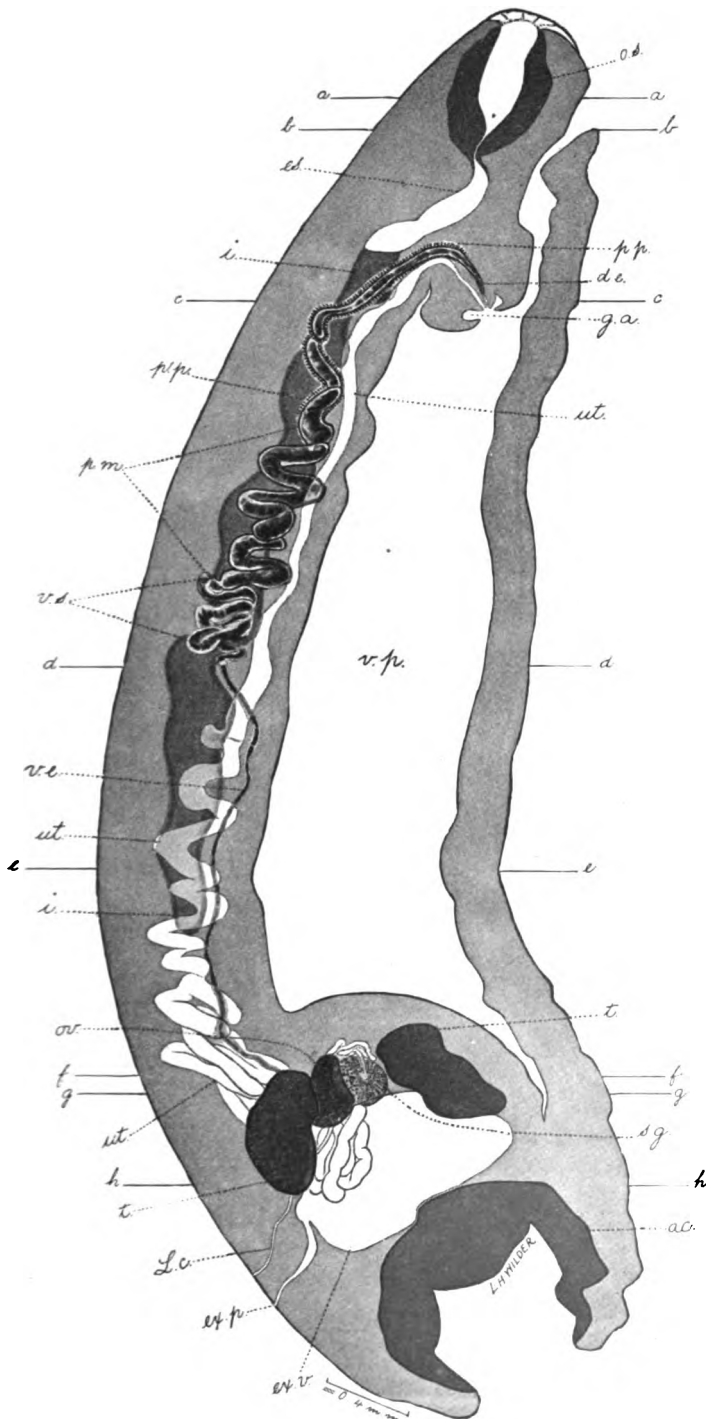


FIG. 2.

intestinal bifurcation about one-sixth of body length from oral margin; intestinal ceca extend to caudal end of equatorial third of body. Excretory pore 0.16 mm.

caudad of pore of Laurer's canal; excretory canal runs ventro-cephalad to dilated vesicle cephalad of acetabulum.

Male organs: Testes somewhat lobate, one ventral of the other, separated by ovary, one extending to right the other to left of median line, thus zones and fields overlap; the testes lie between acetabulum and fundus of ventral pouch; vasa efferentia arise on dorsal aspect, unite slightly cephalad of equator of body; vas deferens much coiled; pars prostatica less coiled; ductus ejaculatorius probably discharges independently of metratrem.

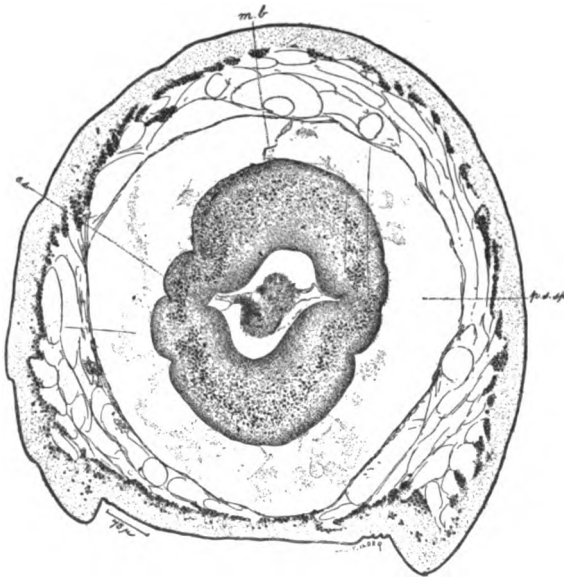


FIG. 3.

Female organs: Ovary and shell gland between testes; vitellogene glands consist of sparsely scattered follicles in ventrolateral body segments extending from slightly caudad of apparent genital pore to acetabulum; uterus extends from shell gland caudad, dorsally, turns cephalad, and runs between vasa efferentia, dips ventrally, extending cephalad, ventrally of vas deferens, to genital pore; Laurer's canal runs from oviduct dorso-caudad, opens on plane of cephalic margin of acetabulum, about 0.16 mm. cephalad of excretory pore.

Eggs: Few in number, 135 by 75μ in sections.

TYPE.—U.S.B.A.I. 15328.

HABITAT.—In (? organ of) *Bos kerabau*, from Ceylon.

SOURCE OF MATERIAL.—

The single specimen studied was taken from bottle numbered 3377, containing a label with the following legend:

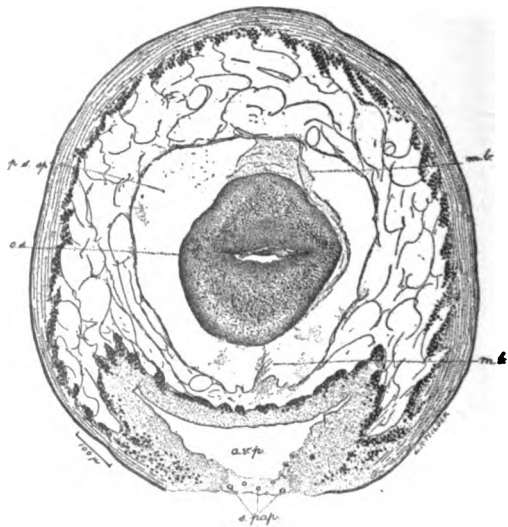


FIG. 4.

Name, *Gastrothylax elongatus* Poir. Host, *Bos kerabau*. Locality, Königsberg, Tiergarten (from Ceylon). Determined by Fischæder. Collected by Fischæder. Presented by Luehe, June, 1902.

The specimen was sectioned with a view to serving for purposes of comparison, but was found to differ from *G. elongatus* in several respects. Its new number is 15328.

EXTERNAL CHARACTERS.

SIZE.—The measurements taken from the sectioned specimen give a length of 6.4 mm. and greatest transverse and dorso-ventral diameters of about 2 mm. each.

COLOR.—The specimen was of a buff color.

FORM.—In form it closely resembled *F. elongatus*, being somewhat spindle or cone shaped. While the greatest transverse diameter was in the equatorial region, the greatest dorso-ventral diameter was in the caudal third of the body. This appears to have been brought about by slight compression or shrinking from side to side of the caudal portion. The longitudinal axis is curved with the concavity ventrad. The cephalic extremity is bluntly pointed; the caudal is broad though somewhat attenuated as compared with the equatorial region. In the cephalic portion the transverse section is nearly circular but with some flattening ventrally in the region above the aperture of the ventral pouch (fig. 3); in the equatorial region the form in transverse section tends to assume a rounded-triangular outline (figs. 6 and 7) with the apex of the triangle ventrad.

SURFACE.—The surface cuticle is unarmed; but a few blunt papillæ were observed on the cephalic portion and on the lip of the aperture of the ventral pouch (fig. 4).

Ventral pouch.—About 0.5 mm. caudad of the cephalic margin there is a transverse slit which marks the ventral aspect of the animal and serves as the aperture of the ventral pouch (see fig. 4). The lip of the aperture curves latero-cephalad from the median line forming two lateral ridges (see fig. 3), which rapidly fade out. Included between these ridges is a portion of the ventral aspect of the cephalic

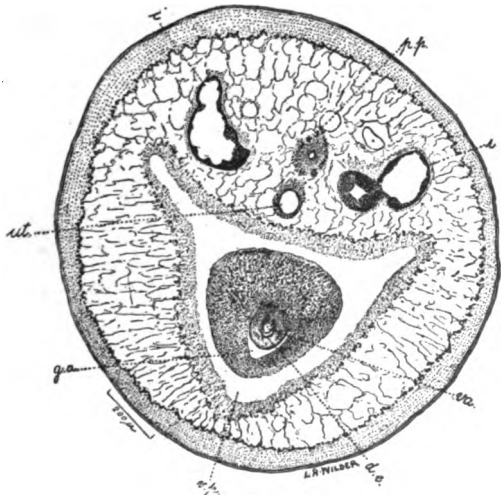


FIG. 5.

extremity which is flattened and continuous with the dorsal wall of the neck of the pouch. The aperture gives entrance to a ventro-dorsally narrow passage which extends caudad to the level of the genital pore, beyond which this neck dilates rather rapidly to form the body of the pouch (fig. 2). The pouch extends caudad to a point slightly cephalad of the genital organs. The fundus of the pouch bulges somewhat cephalo-ventrad into the lumen in such a manner that the dorsal wall of the pouch is the shortest, the ventral the longest, and the lateral walls intermediate between the two. A dorso-ventrally very narrow, crescentic, slit-like prolongation of the pouch extends caudad in front of the ventral testis to the plane of the caudal aspect of the latter (figs. 2, 8, 9). In transverse section the aperture of the ventral pouch is a crescentic slit, measuring 0.45 mm. from horn to horn and about 0.1 mm. ventro-dorsally; the canal above (cephalad of) the genital pore retains the crescentic outline of the aperture, but below this level it tends to a triangular form,

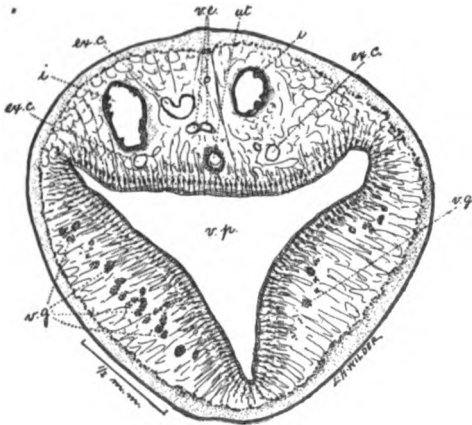


FIG. 6.

which becomes well defined in the body of the pouch. The apex of this triangle, like that of transverse sections of the body of the animal, is directed ventrad. Corresponding to the position of the angles of this triangle the inclosing body is constricted, marking off three segments, a dorsal and a right and left ventro-lateral, of which the dorsal is somewhat the largest (see figs. 6 and 7). In the equatorial

region the longitudinal axis of the pouch and that of the body are substantially identical.

Genital pore.—On the dorsal wall of the neck of the ventral pouch at the vertex of a large muscular somewhat hemispherical bulging is the genital pore (figs. 2, 5). The pore leads into an atrium, the dorsal wall of which is in the form of a papilla, at the vertex of which is the opening of the ductus ejaculatorius and beneath and adjacent to this that of the metraterm. In the only specimen available for study the genital pore seemed to be in a plane slightly post-bifurcal. This appears to be due, however, to an artificial crowding or bending caudad of the hemispherical bulging which bears it. It is easily conceivable that a crowding or bending in the opposite direction would bring the pore to, or close to, the aperture of the ventral pouch.

Acetabulum.—This muscular organ, measuring about 1.04 mm. in diameter, occupies the caudal terminal portion of the body. It is, like that of *F. elongatus*, dome shaped, having an aperture measuring 0.05 mm., which is directed caudad and, because of the bending of the body axis, very slightly ventrad.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The bluntly pointed cephalic extremity is pierced by the mouth, which leads directly into a muscular oral sucker about 0.6 mm. long. This sucker lies in a large cavity (*p. s. sp. figs. 3, 4*), strongly suggestive of a rudimentary body cavity, which is traversed dorsally and ventrally by mesenterium-like bands (*m. b. figs. 3, 4*). The lumen of the sucker, in transverse section, is

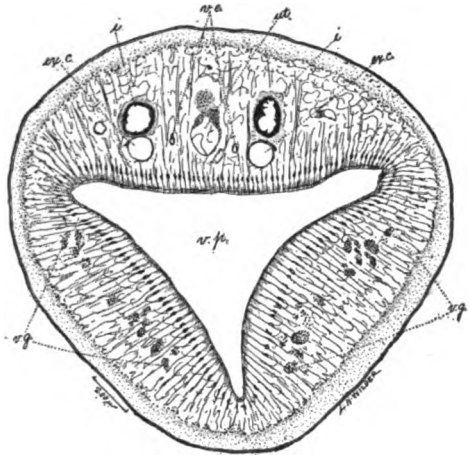


FIG. 7.

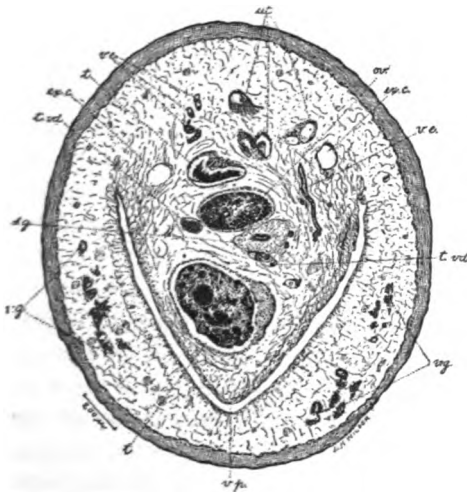


FIG. 8.

roughly circular near the mouth, but spindle shaped at its equator (fig. 3), with the long axis of the spindle in the transverse diameter of the animal; farther caudad this spindle becomes flattened dorso-ventrally so that the lumen becomes a transverse slit, which eventually becomes reduced to a small circular aperture as it gives entrance to the esophagus. It is provided with a number of not very prominent papillæ. The esophagus, as it leaves the base of the sucker, describes a fairly abrupt curve having its convexity ventrad and then passes caudo-dorsad to divide into two intestinal ceca; the esophagus measures about two-thirds the length of the oral sucker; dorsally of its cephalic portion is found a well-developed nerve complex.

The simple intestinal ceca pass for a short distance latero-caudad, then in irregular sinuous course caudad in the dorsal body segment. They terminate at the junction of the middle with the caudal third of the body.

The lumen of the oral sucker and that of the esophagus are lined by a cuticular layer in anatomical continuation with that of the body-surface. It is thin in the sucker, thicker in the esophagus, and ceases abruptly at the fork. The intestinal lumen is lined by a layer of epithelial cells.

GENITAL SYSTEM.—The two testes, the ovary, and the shell gland are in the caudal portion of the body between the fundus of the ventral pouch and the dome of the acetabulum, one testis lying dorsally, the other ventrally of the female glands.

Male organs.—The testes lie in about the same dorso-ventral plane, the left in front (ventral) of the right and separated from the latter

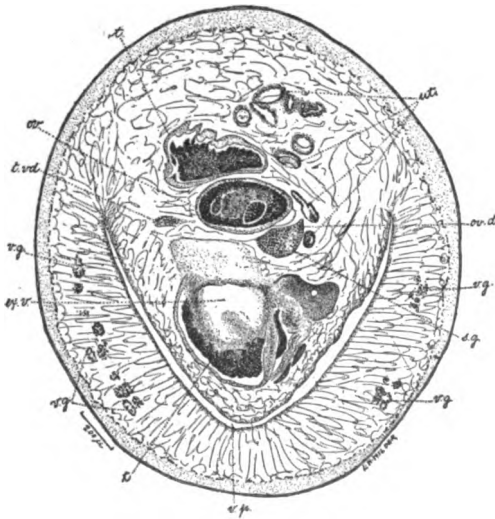


FIG. 9.

by the interposition of the ovary, shell gland, and the dome of the distended excretory vesicle. The ventral testis extends more to the left of the median line, while the greater portion of the dorsal testis lies immediately to the right of this line, their fields consequently overlap; the latter testis lies also in a plane that is slightly lower (more caudad) than that of the former, their zones overlapping (figs. 1, 2, 8, 10).

Both glands appear much shrunken, and each is made up of several lobes; the right is slightly larger than the left and the caudo-dorsal aspect of the latter appears excavated and molded to the contour of the ventro-cephalic aspect of the distended excretory vesicle (fig. 9). From the dorsal aspect of each testis there arises a vas efferens. These ducts pass dorso-cephalad, that from the left or ventral testis describing a somewhat sinuous course as it curves around to the left of the shell gland and ovary. Near the dorsum of the animal and in a plane just above (cephalad of) the testes, these ducts, one on each side of and slightly removed from the median line, turn directly cephalad and pursue a slightly sinuous course to the equator of the animal; at this level they begin to arch

inward toward the median line and soon unite to form the vas deferens (fig. 6). In the greater part of their course cephalad they lie more or less close to the ventro-median aspect of the corresponding cecum with the uterus between them (fig. 7).

The vas deferens, almost immediately after it begins, develops a complex coil and its lumen becomes more or less dilated and filled with spermatozoa; this portion represents the vesicula seminalis. Soon its walls, which appear as delicate as those of the vasa efferentia, become abruptly thickened by an enormous increase in the muscular layers and its lumen becomes much reduced in caliber. This portion of the vas deferens (*pars muscosa*) continues the coil begun by the vesicula, but after pursuing a course cephalad for about twice as long a distance as that of the vesicula, the muscular wall of the duct becomes enclosed in a moderately thick layer of cells. From this point, which is about at the junction of the first with the middle third of the body, the complexity of its loops becomes very greatly reduced, its course cephalad becomes less and less wind-

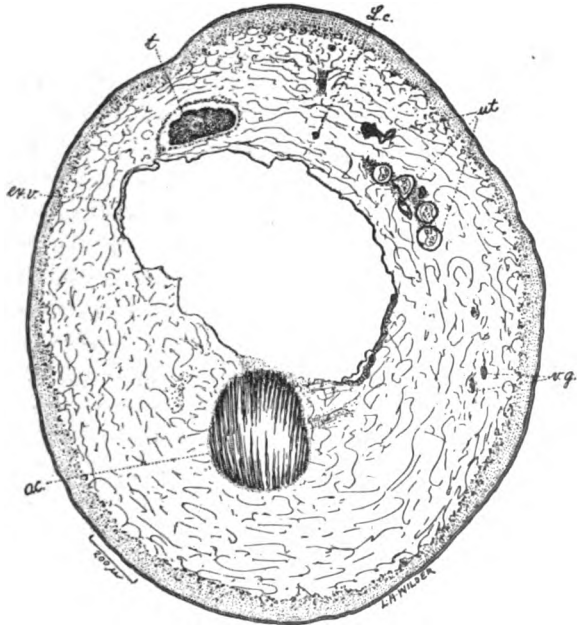


FIG. 10.

ing and the thickness of its muscular wall slowly diminishes; this portion represents the *pars prostatica*. The coils of the vesicula, muscosa, and the windings of the first portion of the prostatica lie in the space between the corresponding portions of the intestinal ceca. As the prostatica nears the esophageal fork it tends ventrad and eventually reaches the ventral aspect of the fork at which level it describes a curve in the sagittal plane of the body with the convexity of the curve cephalad (fig. 2). At the vertex of this curve the prostatic cells abruptly cease and the duct, which at this point has become somewhat reduced in size though still with walls of considerable thickness, turns ventro-caudad, approaches and then penetrates the base of the genital papilla, at the vertex of which,

having become rapidly reduced in size, it opens by a minute pore just above the aperture of the metraterm (or possibly by a pore that is common to both ducts). The single specimen available for study does not show this with sufficient clearness for definite interpretation. To the portion of the male spermatic canal beyond the prostatica the name ductus ejaculatorius may be applied.

Female organs.—Lying in the axial region of the body between the upper (cephalic) portions of the two testes are the ovary and the shell gland, the latter being close to the left ventro-lateral aspect of the former (figs. 8, 9). The superior aspect of the ovary lies in a transverse plane that is slightly below (caudad of) the superior margin of the ventral and slightly above (cephalad of) that of the dorsal testis. The oviduct springs from the ventro-caudal aspect of the left pole of the ovary at the level of the caudal aspect of the shell gland to which the duct runs and which it penetrates, bending cephalad as it does so. In the shell gland it is joined by the vitello-duct. The shell gland is an egg-shaped body, considerably smaller than the ovary, close to the left ventro-lateral aspect of which it lies, with its long axis in the transverse diameter of the body of the parasite and with the broader, more bluntly rounded pole to the left. It is penetrated by the oviduct and the vitello-duct; the former at the caudal and the latter at the left ventro-lateral aspect. The two unite and the joint duct thus formed passes transversely to the right and slightly cephalad, forming the ootype in the center of the gland. Beyond this dilatation the duct is continued as the uterus, which emerges from the right pole of the gland (fig. 8). From this point the uterus curves over to the left of the shell gland. As it skirts close to the left of the shell gland, ovary, and dorsal testis in its course to the middle line of the dorsal segment some coils dip caudad to the left of the excretory vesicle. Having reached the median line it winds its way cephalad first between the vasa efferentia then under their arch and close to the ventral aspect of the vas deferens, retaining this relation to the male genital duct in the remainder of its course and forming a curve similar to that of the pars prostatica at the level of the esophageal fork before it, as the metraterm, penetrates the genital papilla at the vertex of which it opens either just below and separate from the aperture of the male genital duct or in common with it.

The uterine canal contains relatively few eggs; these were most numerous in the portion nearest the ovary. Measurement of one of these in section gave a length of 135μ and a width of 75μ . Laurer's canal leaves the oviduct from a point close to the shell gland and then passes dorso-caudad to open by a minute pore in the dorso-median line a little below the superior margin of the acetabulum and about 0.16 mm. above the excretory pore.

The vitellaria consist of sparsely scattered follicles confined to the ventro-lateral body segments. In a vertical direction they extend from a little below the level of the genital pore to the level of the superior margin of the acetabulum. The transverse vitello-ducts pass transversely inward with a tilt cephalad to unite in the median line dorsally and slightly caudally of the superior margin of the ventral testis and just cephalad of the plane of the superior margin of the shell gland. Their point of union is not dilated into a reservoir, but a slender duct is given off which passes at first caudad for a very short distance, then to the left, skirting the ventral aspect of the shell gland which it penetrates near the left extremity and, describing a sharp curve as it does so, becomes directed to the right and unites with the oviduct.

EXCRETORY SYSTEM.—The excretory vesicle is large and distended and fills the space between the male and female sexual glands above (cephalad) and the acetabulum below (caudad) (figs, 2, 9, 10). From its dorsal aspect there springs a short excretory duct which passes caudo-dorsad to open in the dorso-median line about 0.16 mm. caudad of the pore of Laurer's canal. The duct is lined by a fairly thick cuticular layer in anatomical continuation with that of the general body surface. Two large longitudinal excretory canals are found at about the level of the esophageal fork, where they lie near the dorso-lateral aspect of the corresponding ceca. As the intestines shift latero-dorsad, the canals come to lie first close to the median side and later close to the ventro-median and ventral aspect of the ceca (figs. 6, 7). The canals pass caudad to a point in the transverse plane of the superior margin of the ventral testis, when they bend somewhat ventrad to empty into the excretory vesicle.

RELATION TO OTHER SPECIES.

This worm seems most closely related to *F. elongatus*, from which it differs chiefly in the greater proportionate length of its intestine; in the position of the ovary and shell gland, which lie between the upper portion of the testes in this form, whereas in *F. elongatus* they are caudad of the dorsal testis.

ILLUSTRATIONS.

FIG. 1.—Frontal projection showing oral sucker (*o. s.*), esophagus (*es.*), intestinal ceca (*i.*), portion of the uterus (*ut.*), the testes (*t.*), vasa efferentia (*v. e.*), and acetabulum (*ac.*). *a-a, b-b, c-c, d-d, e-e, f-f, g-g, h-h*, planes of section. Enlarged. Original.

FIG. 2.—Profile projection showing oral sucker (*o. s.*), esophagus (*es.*), left intestine (*i.*), the ventral pouch (*v. p.*), the genital bulging with the genital pore leading into the genital atrium (*g. a.*), the uterus

(*ut.*), shell gland (*s. g.*), ovary (*ov.*), the testes (*t.*), left vas efferens (*v. e.*), vesicula seminalis (*v. s.*), pars muscosa (*p. m.*), pars prostatica (*p. p.*), ductus ejaculatorius (*d. e.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), and acetabulum (*ac.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, *h-h* planes of section. Enlarged. Original.

FIG. 3.—Transverse section at *a-a* figs. 1 and 2. Shows oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), and a dorsal dorso-ventral mesenterium-like strand (*m. b.*). Enlarged. Original.

FIG. 4.—Transverse section at *b-b* figs. 1 and 2. Shows aperture of ventral pouch (*a. v. p.*), papillæ on lip of aperture (*s. pap.*), oral sucker (*o. s.*), dorsal and ventral mesenterium-like strands (*m. b.*), perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 5.—Transverse section at *c-c* figs. 1 and 2. Shows form of body, ventral pouch (*v. p.*), ductus ejaculatorius (*d. e.*), metraterm (*va.*), uterus (*ut.*), pars prostatica (*p. p.*), and intestines (*i.*). Enlarged. Original.

FIG. 6.—Transverse section at *d-d* figs. 1 and 2. Shows form of body, form of ventral pouch (*v. p.*), intestines (*i.*), excretory canals (*ex. c.*), the vasa efferentia about to unite (*v. e.*), uterus (*ut.*), and vitellogene glands (*v. g.*). Enlarged. Original.

FIG. 7.—Transverse section at *e-e* figs. 1 and 2. Shows form of body, form of ventral pouch (*v. p.*), position and relations of intestines (*i.*), excretory canal (*ex. c.*), vasa efferentia (*v. e.*), uterus (*ut.*), and vitellogene glands (*v. g.*). Enlarged. Original.

FIG. 8.—Transverse section at *f-f* figs. 1 and 2. Shows form of body, form of ventral pouch (*v. p.*), position and relation of the testes (*t.*), ovary (*ov.*), shell gland (*s. g.*), transverse vitello-ducts (*t. vd.*), the vasa efferentia (*v. e.*), uterus (*ut.*), vitellogene glands (*v. g.*), and excretory canals (*ex. c.*). Enlarged. Original.

FIG. 9.—Transverse section at *g-g* figs. 1 and 2. Shows form of ventral pouch (*v. p.*), position and relations of the testes (*t.*), dome of excretory vesicle (*ex. v.*), ovary (*ov.*), caudal extremity of shell gland (*s. g.*), oviduct penetrating shell gland (*ov. d.*), right transverse vitello-duct (*t. vd.*), uterus (*ut.*), and vitellogene glands (*v. g.*). Enlarged. Original.

FIG. 10.—Transverse section at *h-h* figs. 1 and 2. Shows position and relations of the superior margin of the acetabulum (*ac.*), excretory vesicle (*ex. v.*), dorsal or right testis (*t.*), Laurer's canal (*L. c.*), and uterine loops (*ut.*). Enlarged. Original.

FISCHÆDERIUS SIAMENSIS, new species.

[Figs. 11 to 22.]

SPECIFIC DIAGNOSIS.—*Fischæderius* (p. 17): Body 6.6 to 15.5 mm. long; buff color (alcohol specimens); rather spindle shaped, with truncated caudal end, but most specimens distorted; greatest diameter somewhat preequatorial; oral end very

bluntly pointed; longitudinal axis straight or slightly curved with concavity ventrad; transverse sections near both poles circular, but at equator nearly circular or oval to triangular with apex ventrad. Surface with coarse transverse sulci or striations, best defined near poles; otherwise smooth, except for papillæ at oral pole. Crescentic opening of pouch varies in position from oral plane to equatorial plane of oral sucker; neck of pouch with triangular to semicircular outline in transverse section, extends caudad of genital pore, body of pouch is triangular to circular in outline and extends nearly to ventral testis, but a ventral prolongation may enter testicular zone; in equatorial region, longitudinal axis of pouch coincides with axis of body. Genital pore about 0.7 mm. from aperture of pouch, either bifurcal, or slightly pre or post bifurcal; a larger external (ventral) and a smaller internal (dorsal) atrium present, the latter nearly filled by the genital papilla. Acetabulum 1.5 mm. in diameter, aperture circular, 0.6 to 1.0 mm., directed slightly ventrad. Mouth in a crateriform depression; oral sucker pyriform, 0.2 mm. long, 0.2 mm. in dorso-ventral diameter; perisuctorial space distinct; esophagus about as long as oral sucker; bifurcation about on plane of genital pore; ceca short, extend to equator or slightly beyond, tortuous, in longitudinal dorsal body segment. Excretory pore dorso-median or right or left, about on plane of cephalic margin of acetabulum, caudad of pore of Laurer's canal.

Male organs: Testes median, one dorsal of the other, markedly indented, fields and zones overlap, immediately preacetabular; vasa efferentia unite in preequatorial body zone about at junction of cephalic and equatorial thirds; vesicula and musciosa coiled, prostatica sinuous; ductus ejaculatorius opens separately from metraterm.

Female organs: Ovary in testicular zone and field, dorso-caudad or caudad of dorsal testis, median, right, or left of median line; vitellaria chiefly in ventrolateral longitudinal body segments, but to some extent in dorsal segment lateral of ceca, extending about from plane of genital pore to or near the first testis; uterus extends from shell gland dorso-lateral, may dip caudad, turns cephalad, runs dorsally of testes, under union of vasa efferentia, in suctorial field to genital papilla, discharging separately from ductus ejaculatorius; Laurer's canal extends from oviduct in sinuous course cephalo-dorsad to dorsum, and discharges median or right or left, in plane slightly cephalad or caudad of cephalic margin of ovary.

Eggs: Not measured.

HABITAT.—In (? organ of) "Cow" (*Bos* sp.), Phrapatoom Siam.

TYPE.—U.S.P.H. & M.H.S. 9956.

SOURCE OF MATERIAL.—These worms form part of a sending by Dr. P. G. Woolley from Phrapatoom, Siam. The host was given as *Bos* ("cow").

EXTERNAL CHARACTERS.

SIZE.—Measurements of 28 specimens show considerable variation in size. The length varies from 6.66 mm. to 15.5 mm.; in only 7 of 28 specimens does the length exceed 10 mm.

COLOR.—The worms (fixed, and preserved in glycerine alcohol) are of a buff color.



FIG. 11.



FIG. 12.

FORM.—Most of the specimens appear more or less distorted; only a few appear to have preserved what is presumed to be their natural shape. These show considerable variation (figs. 11–14) in form; in general, however, this is not unlike a spindle with a truncated caudal extremity. The greatest diameter of this spindle form is not in the equatorial region of the worm but somewhat preequatorial. The cephalic extremity is very bluntly pointed. The longitudinal axis is straight or very slightly curved with concavity of the curve ventrad. The caudal extremity is truncate; it presents the aperture of the acetabulum, the plane of which, being directed with a certain obliquity from the venter to the dorsum and downward, appears to be tilted more or less ventrad.



FIG. 13.

The outline of the worm in transverse section is approximately circular both at the caudal and the cephalic extremities. In the equatorial region, however, some specimens show a triangular, some a triquadrant, and others a more or less circular or oval form. When triangular, the apex of the triangle is directed ventrad. This ventrally directed angle is replaced by a vertical groove in those specimens presenting a triquadrant form.

SURFACE.—The general cuticular surface is marked by coarse transverse striations or sulci, that are best defined about the cephalic and the caudal extremities; it is smooth otherwise except at the cephalic pole where it is beset by short, more or less conical papillæ which are most numerous and most prominent immediately around the oral aperture. The papillæ measure up to 0.03 mm. in length and up to 0.045 mm. in width at the base.

Ventral pouch.—The position of the aperture of the pouch varies; in some it is in the same transverse plane as the mouth (fig. 16); in others it is somewhat caudad of this plane, namely, about in the equatorial plane of the oral sucker (fig. 15).

The aperture is followed by a passage the dimensions of which increase but slowly up to the level of the genital pore; beyond this its dimensions increase rapidly and soon this passage, which may be regarded as the neck, expands into the body of the pouch. The pouch extends caudad to a point in a transverse plane slightly cephalad of the ventral testis, though in some a more or less crescentic slit-like prolongation is tucked in, as it were, ventrally of this gland.

The fundus of the pouch is in a plane directed more or less obliquely from the dorsum ventrad and caudad so that the dorsal wall of the pouch is shorter than the ventral.



FIG. 14.

The dorsal wall of the neck of the pouch is arched ventrad, relatively slightly in the vertical, but considerably in the transverse direction. It differs markedly, however, from the semipedunculated globular bulging in *F. fischæderi* (fig. 2).

The form of the pouch in transverse sections depends somewhat on the level. The aperture is a simple transverse crescentic slit (fig. 15). At the level of the genital pore the form of the neck of the pouch is or tends to a triangular outline with the apex ventrad (fig. 17). In one of the specimens, however, the outline approached more nearly that of a semicircle, with the arch ventrad.

In the equatorial region of the animal the outline of the pouch varies in different individuals. In some it is triangular; in others it is almost circular, though in some of the latter specimens the pouch may present a triangular outline in a plane farther cephalad.

At the level of the cephalic aspect of the dorsal testis the outline of the pouch in transverse section also varies considerably in different specimens; in some it is a crescentic slit; in others, a caret-like slit, and in still others more or less irregularly circular.

In the equatorial region of the animal the longitudinal axis of the pouch coincides substantially with the longitudinal axis of the body. Whatever the form of the pouch in transverse section, the encircling body is divided into three approximately equal longitudinal segments by constrictions; one of the latter occupies the median ventral line and the others the right and left dorso-lateral regions, respectively (fig. 21). These constrictions correspond in position to the angles of the triangle when the pouch has this form.

Genital pore.—On the dorsal wall of the pouch, about 0.70 mm. from the aperture, is the genital pore. It is at about the level of the esophageal fork in 3 of 7 specimens; in 2 it is above and in 2 slightly below this level. The pore gives entrance to an atrium which appears to be divided into 2 chambers by a ring-like projection of the atrium wall. Of the 2 chambers thus formed, the outer, or ventral, is

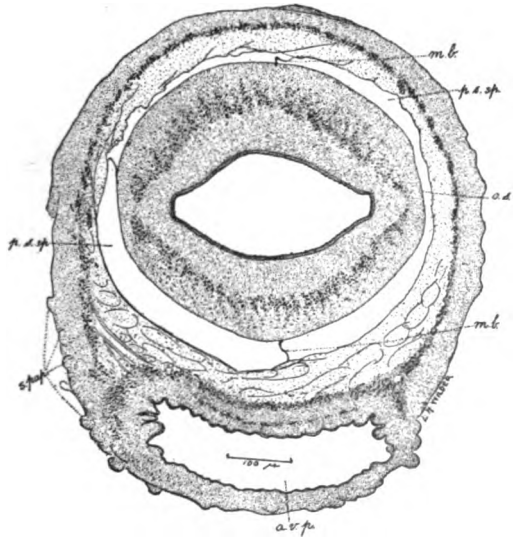


FIG. 15.

much the larger. The inner, or dorsal, is almost completely filled by the genital papilla, leaving only a narrow slit-like space around the latter. The genital papilla projects into the chamber from what would be its dorsal wall. At the vertex of the papilla is the crater-like orifice of the metraterm and immediately above the latter is the minute aperture of the ductus ejaculatorius (figs. 17, 18, 19).

The projecting ring on the atrium wall varies considerably in prominence. In some specimens it is very well marked; in others it is but ill defined and apparently due only to a slight fold or narrow groove in the atrium wall.

Acetabulum.—This excavated somewhat hemispherical muscular organ occupies the caudal portion of the body. The terminal aperture is circular, tilted slightly ventrad, and in two sectioned specimens measured 0.6 mm. and 1.00 mm. in diameter, respectively.

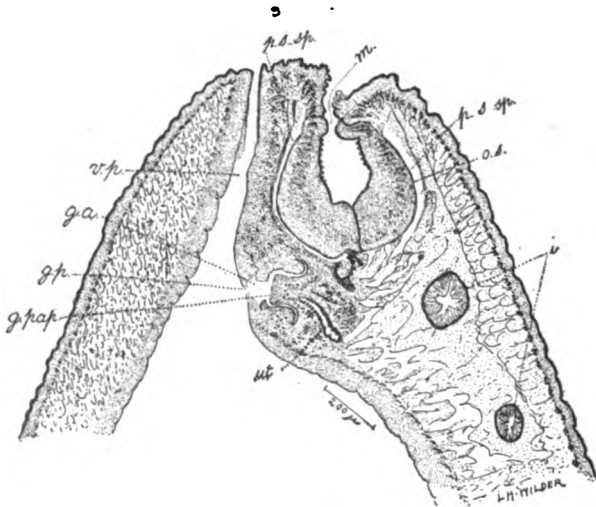


FIG. 16.

The muscular dome measured 0.45 mm. and 0.34 mm., respectively, in thickness in these two sectioned specimens.

The greatest diameter of the acetabulum measured in sectioned specimens was 1.5 mm. in one and 1.17 mm. in another.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The vertex of the bluntly pointed cephalic extremity is more or less depressed in the form of a more or less shallow irregularly circular crater, at the bottom of which is the mouth of the animal. This leads directly into a muscular pyriform oral sucker. The latter lies in a distinct cavity (figs. 15, 16), which is crossed dorsally and ventrally by dorso-ventral strands. Besides these strands,

the sucker is attached at both its poles to the body parenchyma. The lumen of the sucker varies somewhat in form in different individuals. In a general way it is a transversely broad, but dorso-ventrally a rather narrow space. In transverse sections the outline of the lumen varies at different levels. In the region of the mouth it is more or less circular or elliptical; farther caudad, about in the plane of the equator of the sucker, the outlines become spindle shaped with the major axis of the spindle in a transverse direction. This spindle-shaped outline is rapidly reduced to a transverse slit, and the slit in its turn, as the result of a contraction of its transverse diameter, becomes reduced to a small circular aperture which leads into the

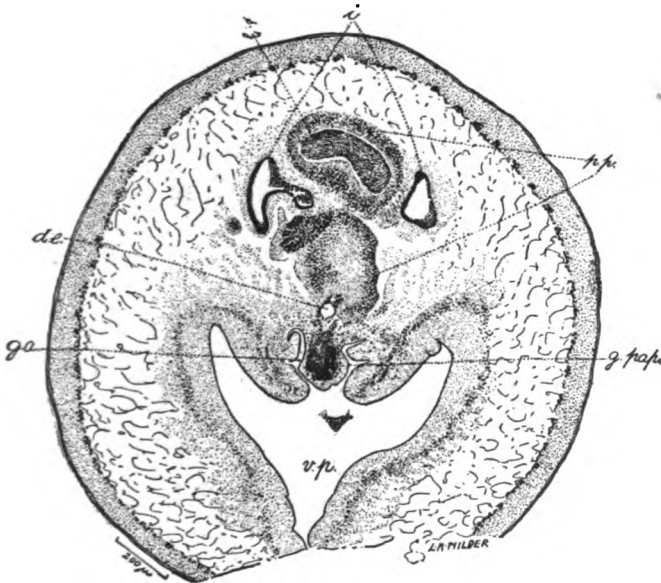


FIG. 17.

esophagus. The lumen is lined by a thin cuticle which, over about the cephalic half, is beset by very minute conical papillæ. The esophagus springs from the base of the oral sucker, and for a very short distance passes caudad in the axis of the latter; then rather abruptly it turns dorsad with but a slight inclination caudad. Its length is about equal to but does not exceed that of the sucker and it divides, laterally, into two intestinal cecal tubes. The angle formed by the fork appears to be somewhat in excess of 90° . The lumen is lined by a thick, cuticular layer.

The intestinal ceca, from their point of origin, pass, at first, latero-caudad, then directly caudad to terminate about midway between the cephalic and the caudal extremities. The ceca may extend

slightly beyond this point, or they may fall distinctly short of it. They pursue a somewhat tortuous course in the dorsal body segment from one-fourth to one-third of the width of the segment mediad of the constriction marking off this segment from the others. The lumen of the esophagus is lined with a cuticle-like layer, which ceases abruptly at the fork. Here it is replaced by a nucleated cell layer which extends throughout the intestine.

GENITAL SYSTEM.—*Male organs:* The testes lie in the caudal portion of the axial region of the body immediately preacetabular (fig. 22). One is more or less directly dorsad of the other, but in slightly different though overlapping zones. The dorsal of the two testes is, as a rule, the one found in the higher (cephalad) of the testicular zones.

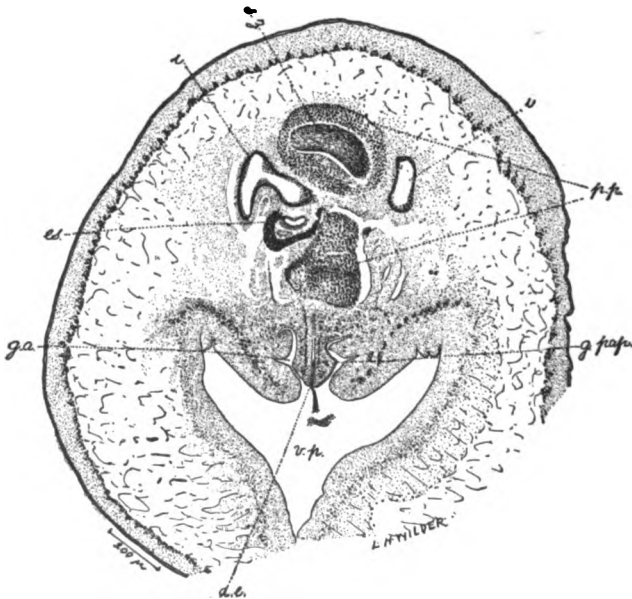


FIG. 18.

As a rule the testis from which the right vas efferens springs (the [?] right testis) is also the dorsal (and cephalic) one. In two of eight specimens studied this arrangement was reversed, the left testis (namely, the testis from which the left vas efferens springs) being dorsad and slightly cephalad of the right.

The margins of the testes are markedly indented, the indentations marking off lobes of different dimensions. From the dorsal or dorso-cephalic aspect of each testis there springs a vas efferens which passes dorsad and slightly cephalad. The vas from the ventrally placed of the two testes, usually the left, describes a curve outward in its course as it skirts the margin of the dorsally placed gland. At about the level of the superior aspect of the superior testis the vasa effer-

entia change their course and proceed directly cephalad in the dorsal longitudinal body segment more or less close to and one on each side of the uterus. At about the level of the equatorial plane of the body of the animal the vasa efferentia come into relation with the intestinal ceca close to the ventro-median aspect of each of which they then continue on their way cephalad. They maintain this relation for some distance, then they bend rather abruptly inward toward the median line to unite and form the vas deferens. This union takes place at about the junction of the anterior with the middle third of the body.

The vas deferens, immediately after it begins, develops coils as it winds its way cephalad. These coils show a lumen which is more or less dilated in different specimens with walls no thicker than those of

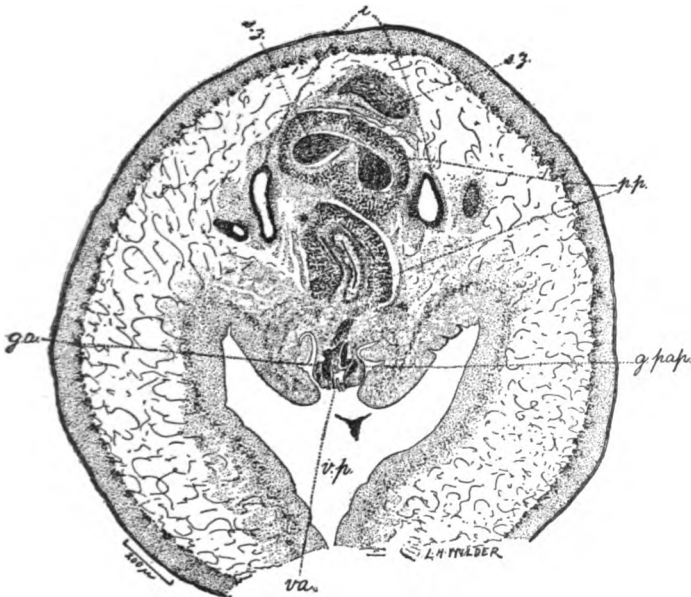


FIG. 19.

the vasa efferentia. This is the vesicula and, after proceeding a short distance, its walls become abruptly thickened by a marked increase in the muscular layer. This portion is the pars musculosa which also forms coils as it proceeds cephalad. These coils have a lumen that in some specimens is little if any smaller than that of the vesicula. This pars musculosa proceeds cephalad to within a short distance of the esophageal arch, where its direction is changed to cephalo-ventrad. At about this point, too, it ceases to form coils and is continued as the pars prostatica of the vas deferens. The pars prostatica pursues a more or less sinuous course and is inclosed in a thick layer of cells with well-defined nuclei. On reaching the base of the genital papilla this cell layer abruptly ceases. Before this point is reached there is ob-

servable also a gradual reduction in the thickness of the muscular coat. After penetrating the genital papilla, the wall of this duct, which now corresponds to the ductus ejaculatorius of other forms, becomes progressively thinner and its caliber becomes rapidly reduced in diameter so that at the vertex its opening is but a minute slit above the large female aperture.

Female organs.—The ovary lies in the testicular zone, dorso-caudad or directly caudad of the dorsally placed testis whether the latter be the left or the right. In other respects, however, its position is subject to considerable variation. In four of seven specimens the ovary was to the right, though close to the median dorso-ventral line; in two it was found in the median line, while in one it was to the left of this line.

The shell gland lies close to the ovary, but in other respects its relation to the latter varies considerably. In five of eight specimens the shell gland was found close to the left ventro-caudal aspect of the ovary, in two it was close to the right ventro-caudal aspect, and in

one instance it was directly ventrad of the ovary.

The oviduct springs from the ovary and passes to the shell gland, which it penetrates. Variations were observed both as regards the aspect of the ovary from

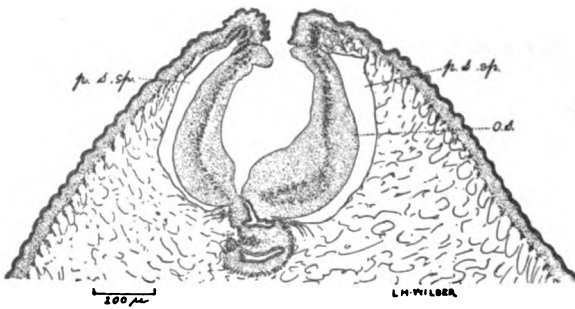


FIG. 20.

which the duct sprang and the path which it pursued in its course to the shell gland. In six of eight specimens the oviduct sprang from the left lateral aspect of the ovary, in one from the right, and in one from the caudal aspect.

The path which the oviduct describes is more or less curved and is either in a transverse (horizontal) or in a more or less vertical plane.

The uterus emerges from the ventral, right or left lateral, or cephalic aspect of the shell gland. In none of the specimens studied did it emerge from either the dorsal or the caudal aspect. From this the uterus passed to the left dorso-lateral area of the body in seven of the eight specimens studied by us; in one instance the uterus passed to the right dorso-lateral region. In these areas the uterus at first may dip somewhat caudad, then it turns dorso-cephalad and toward the median line, passing dorsally of the dorsal testis and of the right or the left vas efferens, according as the uterus occupied the right or the left dorso-lateral areas. Having reached the median dorsal line it pursues a zigzag winding course cephalad with a vas efferens on each

side and passes beneath the arch formed by their union to gain the ventral aspect of the coiled vas deferens. It maintains this relation in the remainder of its course cephalad and ventro-cephalad to the genital papilla, which it penetrates. In this latter portion of its course the zigzag windings have become markedly reduced. Its terminal portion, the metraterm, pierces the genital papilla and opens by a large crateriform pore at the vertex of the latter.

The uterus contains a few eggs and the first portion also some spermatozoa; in one case it contained large cells resembling germ cells. Laurer's canal leaves the oviduct a little before the latter penetrates the shell gland.

It then passes to the dorsum of the animal, describing a more or less sinuous course cephalo-dorsad to the right or left over or beneath the ovary to its pore on the dorsal surface; the pore lies in the median line or more or less to the right or left of it and in a transverse

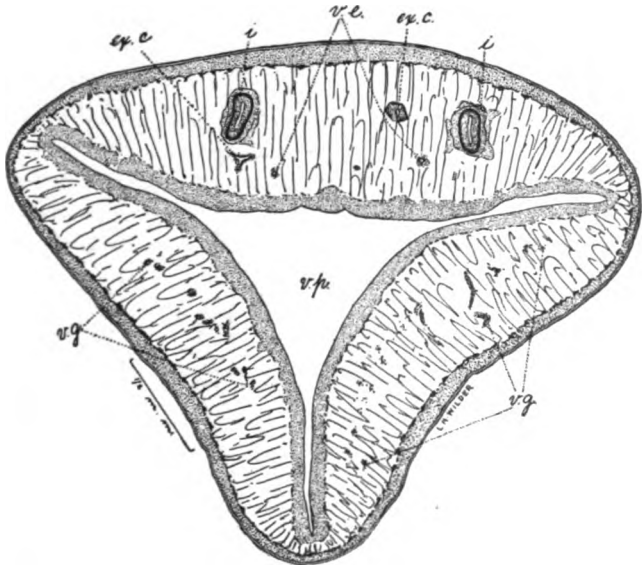


FIG. 21.

plane, which may be slightly above or below the superior margin of the ovary. In seven of eight specimens this point was more or less above the superior margin of the acetabulum, while in the eighth the pore of Laurer's canal was in a plane slightly below the superior margin of the acetabulum.

The vitellaria consist of sparsely scattered somewhat globular follicles, for the most part confined to the ventro-lateral body segments, but encroaching to some extent on those portions of the dorsal body segment external to the line of the intestinal ceca. They extend from about the level of the genital pore to a little short of or occasionally partly overlapping the zone of the superior testis. The transverse vitello-ducts pass mediad and slightly caudad from the lateral regions of the body about at the level of the ovary and ventrad of the latter to unite at the right or the left of and close to the shell gland, at which point a somewhat triangular dilatation is formed. From the

dorsal aspect of this dilatation (? vitelline reservoir) a relatively slender vitello-duct passes toward the shell gland and skirts one of the caudo-lateral aspects of the latter; on reaching the dorso-lateral aspect of this gland it curves cephalo-ventrad to penetrate the gland and then unites with the oviduct in the formation of the ootype.

EXCRETORY SYSTEM.—In the specimens studied the excretory vesicle was collapsed or only slightly distended and was placed dorso-cephalad of and at about the level of the dome of the acetabulum. The excretory duct leaves the dorsal aspect of the vesicle and passes to the dorsum in a more or less sinuous course, in most cases with a slight tendency caudad, but in some horizontally, and in others with a slight tilt cephalad. The excretory pore is caudad of the opening of Laurer's

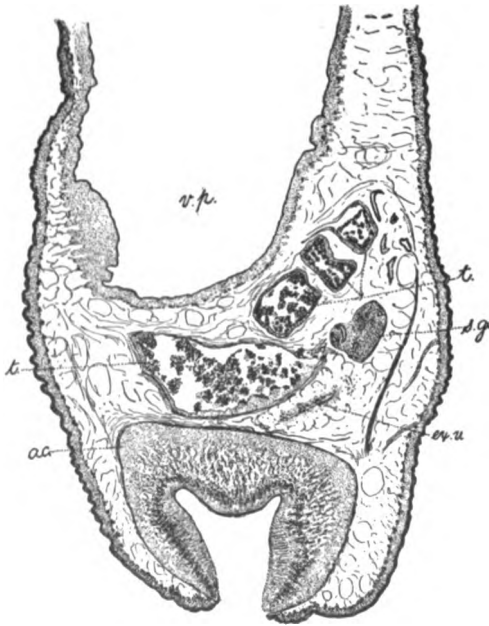


FIG. 22.

canal and is about at the level of the superior margin of the acetabulum, though in none of the specimens was it exactly so; in three of eight specimens it was slightly above and in five slightly below this point. Usually, also, it is in about the median dorsal line, but we found it somewhat to the right in one instance and considerably to the left in another. In each of two specimens it measured about 30μ in diameter.

There are two main longitudinal canals which pass caudad in the dorsal longitudinal body segment lying near and ventral of the in-

testinal ceca in the cephalic half of the body, and they maintain this relative position beyond the termination of the ceca to the excretory vesicle.

ILLUSTRATIONS.

FIG. 11.—Ventral view. Enlarged. Original.

FIG. 12.—Profile view of specimen shown in Fig. 1. Enlarged. Original.

FIGS. 13 and 14.—Profile views to show variation in form. Enlarged. Original.

FIG. 15.—Transverse section at level of aperture of ventral pouch. Shows form of body, surface papillæ (*s. pap.*), form of aperture of

ventral pouch (*a. v. p.*), form of oral sucker and its lumen (*o. s.*), perisuctorial space (*p. s. sp.*), and dorsal and ventral mesenterium-like strands (*m. b.*). Enlarged. Original.

FIG. 16.—Sagittal section through oral extremity. Shows mouth (*m.*), oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), aperture and neck of ventral pouch (*v. p.*), genital pore (*g. p.*), genital atrium (*g. a.*), genital papilla (*g. pap.*), intestine (*i.*), and uterus (*ut.*). Enlarged. Original.

FIGS. 17, 18, and 19.—Series of three transverse sections. Show form of body, form of neck of ventral pouch (*v. p.*), knuckle of esophagus (*es.*), intestinal ceca (*i.*), pars prostatica (*p. p.*) containing mass of spermatozoa (*sz.*), separate openings of ductus ejaculatorius (*d. e.*) and metraterm (*va.*), genital papilla (*g. pap.*) and genital atrium (*g. a.*). Enlarged. Original.

FIG. 20.—Frontal section through oral extremity to show sucker (*o. s.*) and perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 21.—Transverse section to show form of body and of ventral pouch (*v. p.*) in equatorial region. Shows also excretory canal (*ex. c.*), intestines (*i.*), vasa efferentia (*v. e.*) and vitellaria (*vg.*). Enlarged. Original.

FIG. 22.—Sagittal section of caudal extremity showing relations of acetabulum (*ac.*), excretory vesicle (*ex. v.*), testes (*t.*), shell gland (*s. g.*), and fundus of ventral pouch (*v. p.*). Enlarged. Original.

FISCHADERIUS CEYLONENSIS, new species.

[Figs. 23 to 32.]

SPECIFIC DIAGNOSIS.—*Fischaderius* (p. 17): Body 6 to 7 mm. long by 2.56 mm. broad by 2.52 mm. thick; buff color (alcohol specimen); rather conical, but greatest diameter about at junction of equatorial and caudal thirds; rather prominently attenuated cephalad, slightly attenuated caudad; longitudinal axis slightly curved, concavity ventrad; cephalic end bluntly pointed; caudal extremity rather truncate; dorsum somewhat convex, venter slightly concave; lateral margins convex longitudinally; transverse sections near both poles nearly circular, but in equatorial region triangular with rounded angles, apex ventrad. Surface smooth, with exception of a few papillae around mouth and aperture of ventral pouch. Opening of ventral pouch 0.62 mm. from oral margin; pouch begins with a narrow neck which extends to caudal margin of genital atrium (ventral chamber), then dilates into cavity which extends along dorsal wall to cephalic margin of testes and along ventral wall to equator of acetabulum; transverse sections of aperture and neck crescentic, and of cavity rather triangular with apex ventrad. Genital pore 1.18 mm. from cephalic margin, somewhat prebifurcal, in esophageal zone; a large external (ventral) and a small internal (dorsal) atrium present. Acetabulum 1.6 mm. in transverse and about 1 mm. in dorso-ventral diameter, terminal, slightly sunken in body, its 0.46 mm. aperture directed caudad and because of curvature of body-axis very slightly ventrad. Mouth terminal, leads directly into oral sucker which is rather elongate pyriform, 0.62 mm. long, 0.33 mm. broad, 0.3 mm. thick, and lies in a well-developed cavity which is traversed dorsally and ventrally by mesenterium-like bands; esophagus relatively long, 0.72 mm., hence longer than oral sucker; bifurcation at junction of first and second

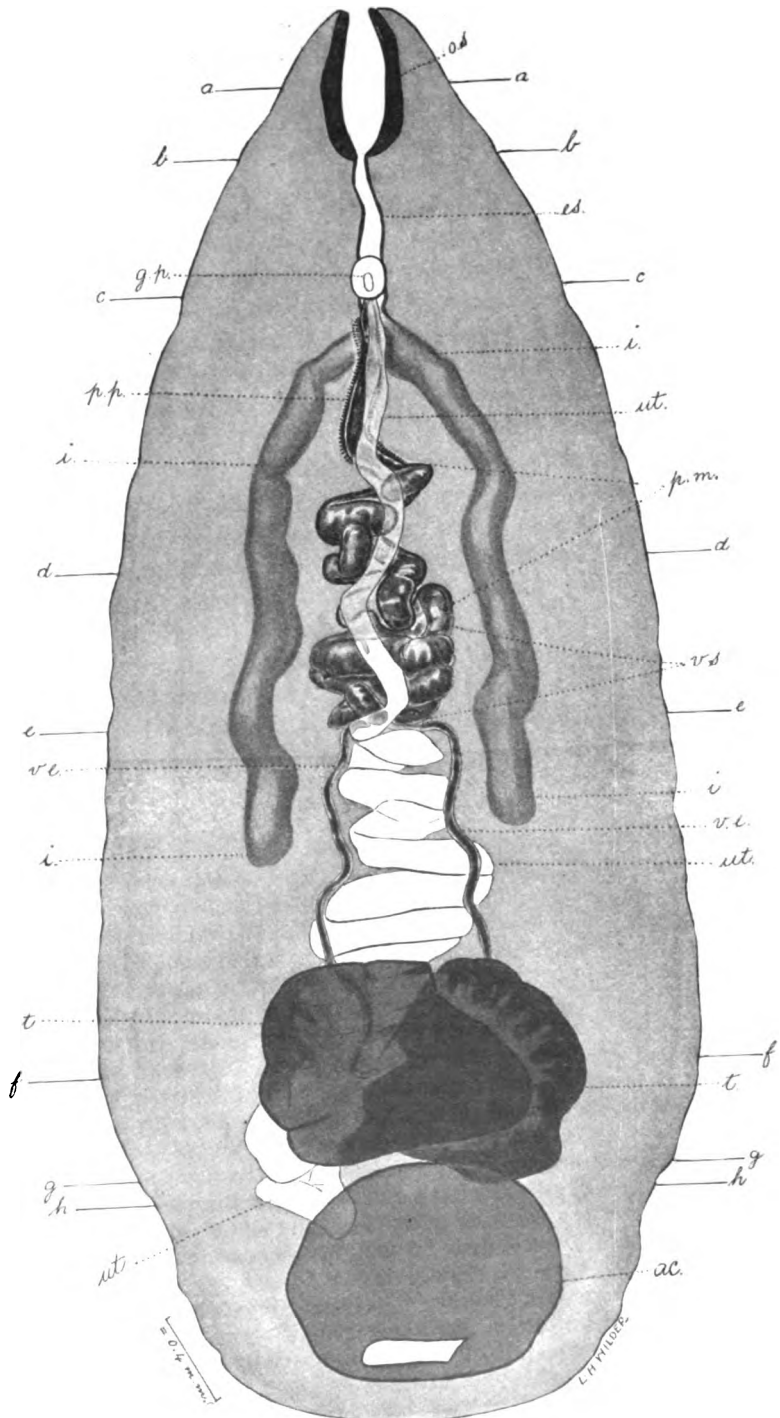


FIG. 23.

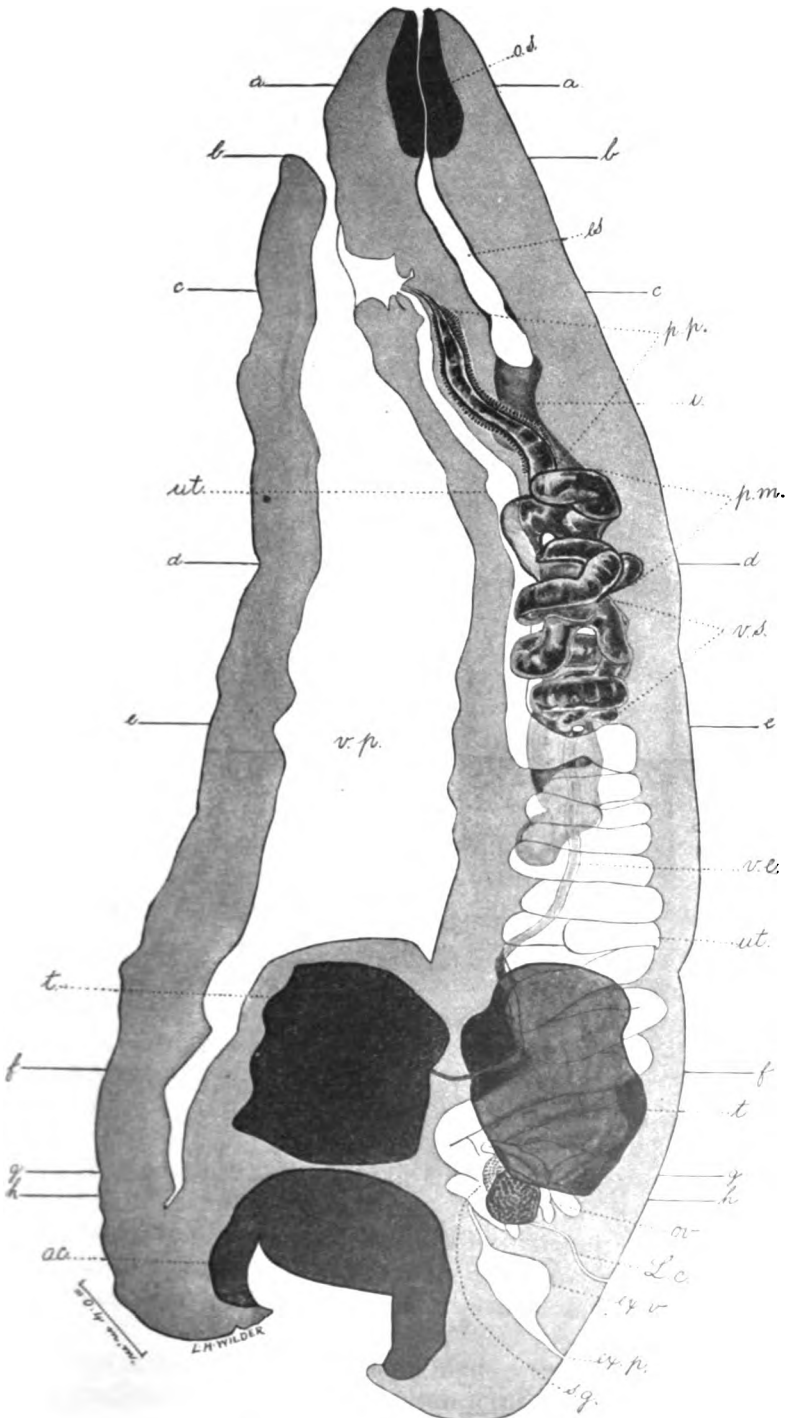


FIG. 24.

fourths of body, ceca short, extend about to junction between third and fourth fifths of body. Excretory pore dorso-median about at equator of acetabulum and slightly (0.36 mm.) caudad of pore of Laurer's canal; duct short, vesicle not much distended in type specimen.

Male organs.—Testes large, indented, one dorsal of the other, immediately pre-acetabular, median, zones coincide, fields overlap, one testis extending more to the right, the other more to the left, of median line; vasa efferentia unite at equator of body; vesicula and pars muscosa well defined and coiled; pars prostatica long, nearly straight; ductus ejaculatorius relatively short, but distinct, discharges separately from metraterm.

Female organs.—Ovary and shell gland ventro-caudal of and very much smaller than dorsal testis; vitellaria in ventro-lateral and dorsal body segments, lateral of ceca, extending from level of caudal end of pars prostatica into but not beyond equatorial third; uterus extends from shell gland dextrad, dips slightly caudad, turns cephalad, forming loops dorsally of ventral and to right of dorsal testis, expands, passes under arch of vasa efferentia, then in slightly irregular line, but without loops, it extends cephalad in suctorial field ventrally of vas deferens, the metraterm discharges just below ductus ejaculatorius into atrium; Laurer's canal extends from oviduct dorso-caudad to dorso-median line 0.36 mm. cephalad of excretory pore and about on plane of cephalic margin of acetabulum.

Eggs: Not observed.

HOST.—*Bos kerabau*, apparently from Ceylon, died in zoological garden in Germany.

TYPE.—U.S.B.A.I. 15358.

SOURCE OF MATERIAL.—The single specimen studied was taken from a bottle numbered 3376, containing a label with the following legend:

Name, *Gastrothylax synethes* Fischøder. Cotype. Host. *Bos kerabau*. Locality, Königsberg, Tiergarten [Leipzig]. Collected by Fischøder. Determined by Fischøder. Presented by Luehe; date, June, 1902.

The specimen, after staining with carmine, dehydration, and clearing, was found to differ from *Gastrothylax synethes* in several respects. It was then numbered 15358, sectioned, and studied in detail.

EXTERNAL CHARACTERS.

SIZE.—The alcohol specimen measured 7 mm. in length and 3 mm. in greatest width. Measurements from sections give 5.98 mm. length, 2.56 mm. greatest width, and 2.52 mm. greatest dorso-ventral diameter.

COLOR.—The worm was of a buff color.

FORM.—In a general way this specimen resembles both *G. synethes* and *G. elongatus*. Its greatest transverse and dorso-lateral diameters are at about the junction of the equatorial with the caudal third of the body. From this region toward the poles these diameters become progressively reduced, markedly toward the oral, slightly toward the aboral pole.

The longitudinal axis is slightly curved with the concavity ventrad.

In transverse section the outline of the body near the oral and aboral extremities is substantially circular (figs. 25-27, 30-31),

though just above the aperture of the ventral pouch the venter is flattened. In the equatorial region (figs. 28, 29) it is triangular in form with rounded angles, one of which occupies the median ventral longitudinal line.

SURFACE.—The surface cuticle is unarmed, but there are a few minute papillæ at the oral pole immediately around the mouth and on the lip of the aperture of the ventral pouch (fig. 26).

Ventral pouch.—On the ventral aspect of the animal, 0.62 mm. (measured from sections) caudad of the oral margin, there is a transverse depression which is the aperture of the ventral pouch (figs. 24, 26). This aperture leads into a ventro-dorsally narrow, slit-like passage which may be regarded as the neck of the pouch. This extends caudad to the lower (caudal) margin of the ventral chamber of the genital atrium, caudally of which it rapidly dilates into the body of the pouch. The body

of the pouch extends caudad to just above the plane of the superior margin of the ventral testis. The fundus of the pouch (as in *F. fischæderi*) bulges somewhat cephalo-ventrad into the lumen in such a manner as to make the dorsal wall of the pouch much shorter than the ventral, and the lateral walls intermediate gradations between the two. As a result

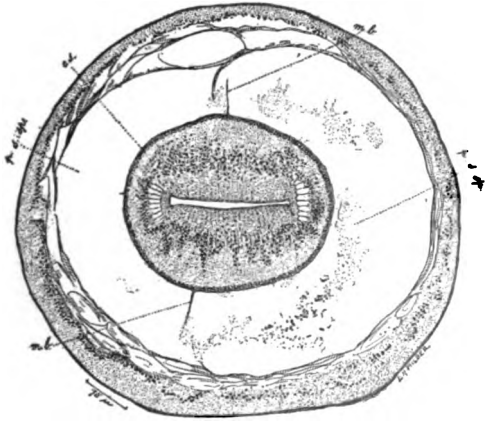


FIG. 25.

of this there is (in transverse sections) a crescentic slit-like prolongation of the pouch caudad between the ventral testis and acetabulum, on the one hand, and the ventral wall of the worm on the other (figs. 24, 30, 31). It extends caudad to a little below the superior margin of the acetabulum.

The outline of the pouch in transverse sections varies at different levels; the aperture is a narrow crescent measuring 0.135 mm. (in sections) in dorso-ventral diameter, with rounded horns, the distance between which is 0.525 mm. (in sections); the neck of the pouch retains the crescentic outline of the aperture; in the equatorial region of the worm the body of the pouch is somewhat triangular in outline with the apex directed ventrad. Corresponding to the position of the angles of this triangle the inclosing body shows constrictions which divide it into three segments, one dorsal and two ventro-lateral, of which the former is somewhat the largest (figs. 28, 29).

In the equatorial zone the pouch occupies substantially the axial region of the animal.

Genital pore.—On the dorsal wall of the neck of the ventral pouch there is a longitudinally elliptical opening, the genital pore, measuring 0.40 mm. in length by 0.30 mm. in width, leading into a large somewhat circular depression measuring 0.20 mm. in greatest depth (figs. 23, 24, 27). At the bottom of this depression (ventral chamber of genital atrium) is a small pore about 0.05 mm. in diameter leading into the slit-like dorsal chamber. The dorsal wall of this is formed by the genital papilla. At the vertex of the latter may be seen the minute aperture of the ductus ejaculatorius, and immediately beneath this, the considerably larger opening of the metraterm.

This papilla is just above (cephalad of) the level of the esophageal fork.

Acetabulum.—This organ of adhesion, measuring about 1.16 mm. in transverse and about 1 mm. in dorso-ventral diameter, occupies the caudal terminal portion of the body, and its aperture, directed downward (caudad) and, because of the curvature of the body axis, slightly ventrad, measures about 0.46 mm. in diameter.

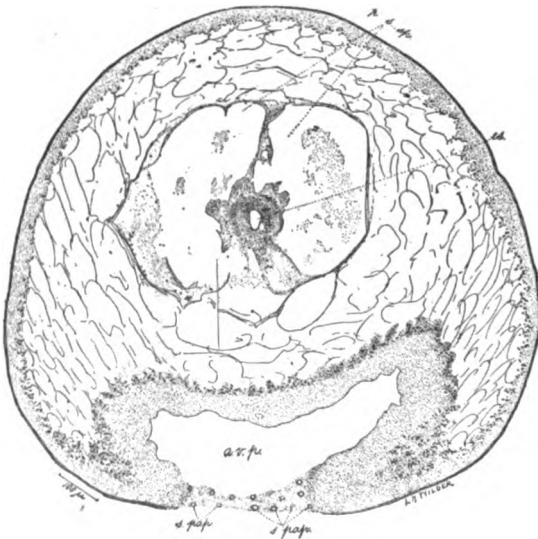


FIG. 26.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The bluntly pointed cephalic extremity is pierced by the transversely elongated spindle-shaped aperture of the oral sucker (the mouth). The sucker consists of a dorsal and a ventral muscular mass continuous laterally (figs. 23–25). The sucker measures 0.62 mm. in length, 0.30 mm. in greatest dorso-ventral, and 0.33 mm. in greatest transverse diameter. Its lumen is a narrow transverse slit, which becomes reduced to a minute aperture at the opening into the esophagus. The sucker rests in a roomy space (*p. s. sp.*, figs. 25, 26), in which it is held in position by its anchorage to the parenchyma and cuticle at its oral extremity, by the esophagus at its caudal extremity, and between these points by dorsal and ventral mesenterium-like strands.

The esophagus begins at the base of the sucker and passes caudad with but a slight tilt dorsad. It measures 0.72 mm. in length, and at the junction of the first with the second fourths of the body length it forks into the two intestinal ceca. The latter pass at first (for about one-fourth of their length) latero-caudad then in a direct though slightly sinuous course directly caudad in the dorsal body segment to terminate by cecal extremities at about the junction of the third with the fourth fifth of the body length. The cecal extremities lie, however, in slightly different transverse planes, the left being slightly above the right. As in *F. elongatus*, the lumen of the sucker and that of the esophagus are lined by a cuticle in anatomical continuation with that of the body surface; it is thin in the sucker, thicker in the esophagus, and ceases at the bifurcation. The intestinal ceca are lined throughout by a layer of epithelial cells.

GENITAL SYSTEM.—The testes, the ovary, and the shell gland are in the caudal portion of the body immediately cephalad of the acetabulum.

Male organs.—The two large testes lie in the same dorso-ventral line, the left dorsad of the right. The bulk, however, of the left testis lies to the left of the median line while that of the right or ventral testis lies to the right of the median line, so that their fields overlap. Both testes show marked indentations. A vas efferens springs from the dorsal aspect of each testis (fig. 30). From its point of origin the left vas efferens passes almost directly cephalad in the dorsal body segment a little to the left of the median line. The right vas efferens, on account of the difference in the position of the testes, is longer and at first runs almost horizontally dorsad but very soon turns and runs directly cephalad a little to the right of the median line. The two vasa efferentia unite in the median line in the equatorial plane of the body. Just before they unite each vas describes a curved course mediad so that by their union they form a transverse arch (figs. 29, 23). In their course the vasa are separated one from the other by coils of the uterus and their distal portions

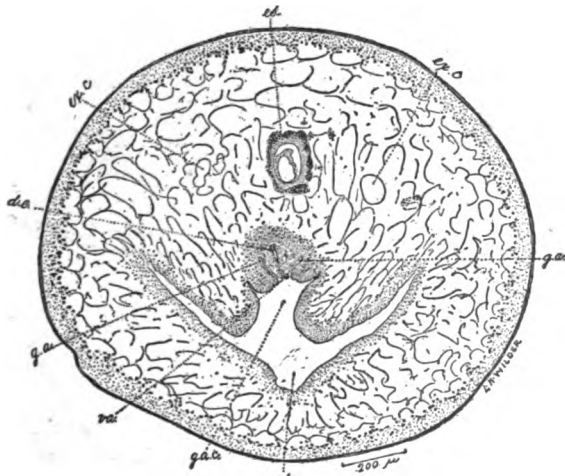


FIG. 27.

run more or less close to the ventromesial aspect of the terminal portions of the corresponding intestinal ceca.

The vas deferens, formed by the union of the vasa efferentia, shows a well-marked, thin-walled vesicula seminalis, a well-defined pars muscosa, 127μ in diameter with walls 37μ in thickness (both portions very much coiled) and a long pars prostatica. The latter pursues an almost direct course cephalo-ventrad beneath, and then ventrally of the esophageal fork and caudal portion of the esophagus to the base of the genital papilla. At this point the prostatic cells enclosing the pars prostatica cease and the continuation of the duct pierces the genital papilla and opens by a minute aperture at the vertex of the latter. This terminal portion of the male canal becomes

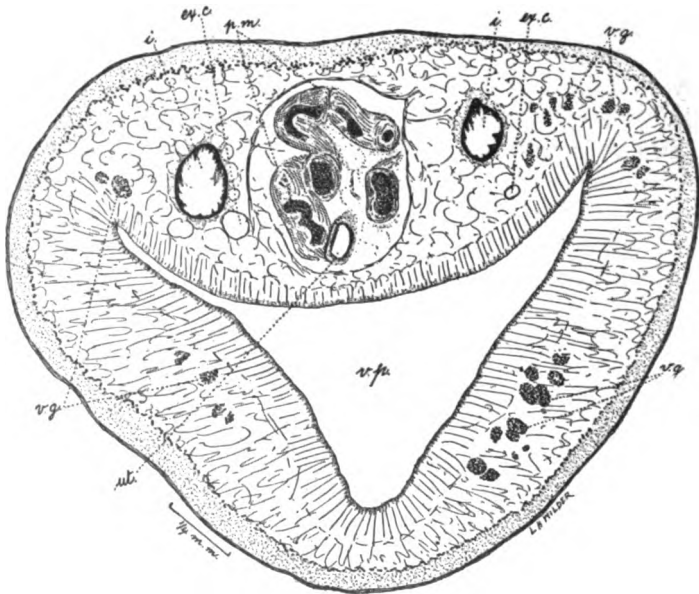


FIG. 28.

very rapidly thin walled and greatly reduced in caliber and corresponds to the ductus ejaculatorius.

Female organs.—The ovary and shell gland lie obliquely side by side, close to the ventro-caudal aspect of the dorsal (left) testis (figs. 31, 24). The ovary lies obliquely to the left of the shell gland and gives origin to the oviduct from its right lateral aspect. The oviduct at first passes slightly caudad from its point of origin, then turns abruptly to the right and cephalad to penetrate the dorso-caudal aspect of the shell gland, within the body of which it is joined by the vitelloduct and forms the ootype. The shell gland lies close to the right cephalo-mesial aspect of the ovary. It is penetrated, as already described, by the oviduct and a little to the right of the

latter by the vitellogland; these unite to form the ootype which is continued as the uterus, emerging as such from the cephalic aspect of the shell gland. From its point of emergence the uterus passes to the right, dips slightly caudad, and then ascends cephalad forming coils dorsally of the ventral and to the right of the dorsal testis. Gradually the distended coils tend toward the median line

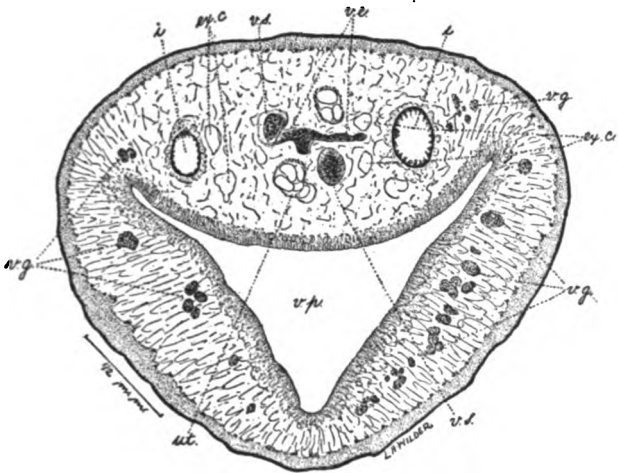


FIG. 29.

of the body and soon come to occupy the space between the vasa efferentia. When the uterus reaches the arch formed by the union of the vasa efferentia it passes beneath and ventrally of the latter and ceases to form coils. It now takes an almost direct though

slightly sinuous course cephalad close to the ventral aspect of the coils formed by the vesicula and pars prostatica and finally close to the ventral aspect of the pars prostatica and ductus ejaculatorius, to open by a pore of relatively considerable size at the vertex of the genital papilla below but very close to, though apparently quite distinct

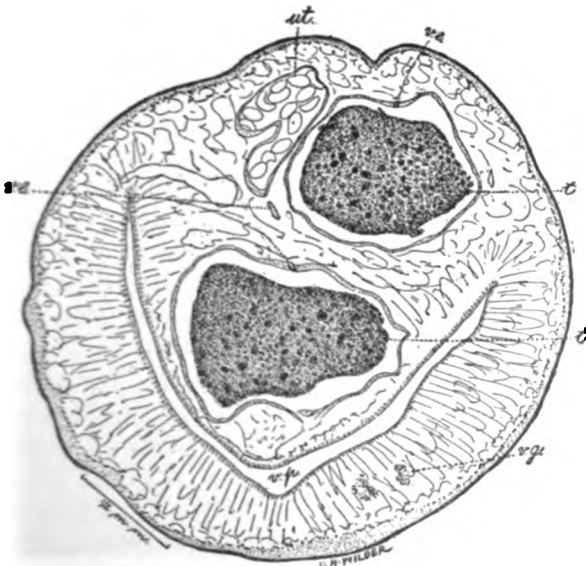


FIG. 30.

from, the male genital pore. Laurer's canal leaves the oviduct at about the point where the latter turns abruptly cephalad in order to penetrate the shell gland, passes dorso-caudad, and opens by a minute

pore on the dorsum about 0.60 mm. cephalad of the caudal pole of the body and about 0.36 mm. cephalad of the excretory pore.

The follicles composing the vitellogene glands (figs. 28, 30) are scattered through the ventro-lateral body segments in a manner similar to that obtaining in *F. elongatus*, and in the dorsal body segment external to the intestinal ceca. Longitudinally the gland follicles extend from a plane corresponding to the caudal end of the pars prostatica caudad to the plane of the cephalic aspect of the testes. From about the caudal extremity of each vitelline gland a duct passes medio-caudad; the two transverse ducts unite close to the ventral aspect of the shell gland at about the level of the ootype. A well-defined vitelline reservoir is not present, unless the transverse ducts which are of considerable caliber and filled with vitelline cells

may be so regarded. From the point of union of the transverse ducts a duct passes off in a direction caudad close to the ventral aspect of the shell gland, and follows its contour around to its dorso-caudal aspect. Here this duct penetrates the gland to unite in its substance with the oviduct.

EXCRETORY SYSTEM.—The excretory vesicle lies caudo-ventrally of the ovary and shell gland and dorsally of the dome of the acetabulum.

In the single specimen studied the vesicle appears for the most part as a transverse slit, distended slightly only in its caudal portion. From its caudal aspect a short duct is given off which passes dorso-caudad to open by a pore caudad of Laurer's canal. This duct is lined by a cuticle in anatomical continuation with that of the surface.

RELATION TO OTHER SPECIES.

The topography of the genital system and the termination of the intestinal ceca in the equatorial region bring this worm close to *F. elongatus* and *F. fischæderi*. The long esophagus and the roomy ventral chamber of the genital atrium, quite distinct from that in either *F. elongatus* or *F. fischæderi* appear to indicate that this is a distinct species and clearly differentiates it from both of them.

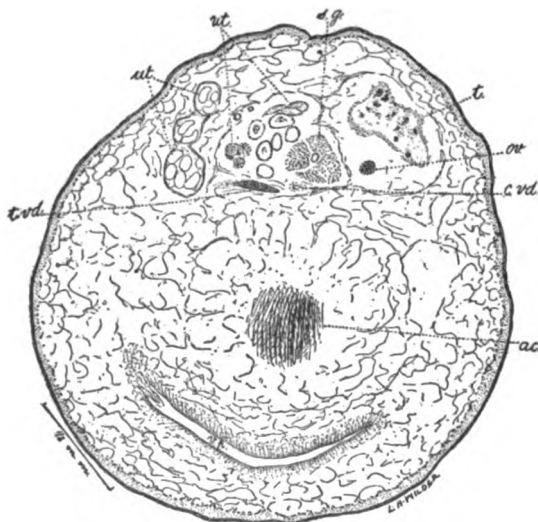


FIG. 31.

ILLUSTRATIONS.

FIG. 23.—Frontal projection. Shows oral sucker (*o. s.*), esophagus (*es.*), position of genital pore (*g. p.*), intestinal ceca (*i.*), testes (*t.*), vasa efferentia (*v. e.*), vesicula seminalis (*v. s.*), pars musculosa (*p. m.*), pars prostatica (*p. p.*), uterus (*ut.*), and acetabulum (*ac.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, *h-h* planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 24.—Profile projection. Shows oral sucker (*o. s.*), esophagus (*es.*), right intestine (*i.*), testes (*t.*), right vas efferens (*v. e.*), vas deferens (*v. s.*; *p. m.*; *p. p.*), shell gland (*s. g.*), ovary (*ov.*), uterus (*ut.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), and acetabulum (*ac.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, *h-h* planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 25.—Transverse section at *a-a* figs. 23 and 24. Shows outline of body, form of oral sucker and of its lumen (*o. s.*), perisuctorial space (*p. s. sp.*), and mesenterium-like strands (*m. b.*). Enlarged. Original.

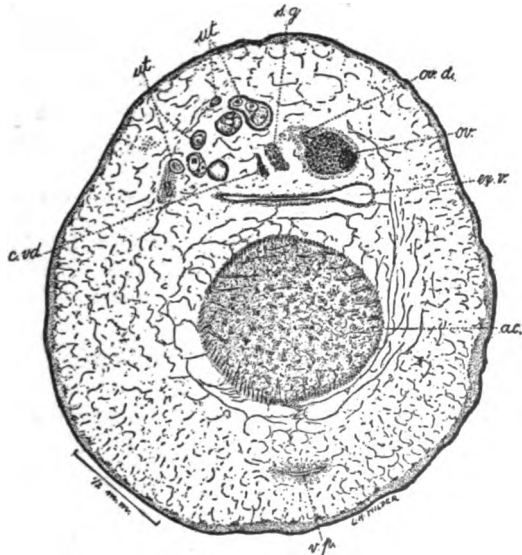


FIG. 25.

FIG. 26.—Transverse section at *b-b* figs. 23 and 24. Shows outline of body at level of aperture of ventral pouch (*a. v. p.*) and relation of latter to beginning of the

esophagus (*es.*), the perisuctorial space (*p. s. sp.*) and surface papillæ (*s. pap.*) on margin of aperture of ventral pouch. Enlarged. Original.

FIG. 27.—Transverse section at *c-c* figs. 23 and 24. Shows outline of body, form of ventral pouch (*v. p.*), dorsal chamber (*g. a.*), ventral chamber of genital atrium (*g. a. c.*), ductus ejaculatorius (*d. e.*), metraterm (*va.*), esophagus (*es.*), and longitudinal excretory canals (*ex. c.*). Enlarged. Original.

FIG. 28.—Transverse section at *d-d* figs. 23 and 24. Shows triangular form of body, ventral pouch (*v. p.*), intestines (*i.*), excretory canals (*ex. c.*), pars musculosa (*p. m.*) of the vas deferens, uterus (*ut.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 29.—Transverse (equatorial) section at *e-e* figs. 23 and 24. Shows form of body and of ventral pouch (*v. p.*), arch of union of vasa efferentia (*v. e.*), vesicula (*v. s.*), uterus (*ut.*), intestines (*i.*), excretory canals (*ex. c.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 30.—Transverse section at *f-f* figs. 23 and 24. Shows form of body, caret-like form of ventral pouch (*v. p.*), testes (*t.*), uterus (*ut.*), origin of vasa efferentia (*v. e.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 31.—Transverse section at *g-g* figs. 23 and 24. Shows form of body, slit-like prolongation of ventral pouch (*v. p.*), superior margin of acetabulum (*ac.*), caudal aspect of dorsal testis (*t.*), cephalic margin of ovary (*ov.*), shell gland (*s. g.*), transverse vitello-duct (*t. vd.*), common vitello-duct (*c. vd.*), and uterus (*ut.*). Enlarged. Original.

FIG. 32.—Transverse section at *h-h* figs. 23 and 24. Shows form of body, slit-like extremity of ventral pouch (*v. p.*), acetabulum (*ac.*), ovary (*ov.*) and origin of oviduct (*ov. d.*), caudal aspect of shell gland (*s. g.*), common vitello-duct (*c. vd.*), uterus (*ut.*), slit-like beginning of excretory vesicle (*ex. v.*). Enlarged. Original.

CARMYERIUS,¹ new genus.

GENERIC DIAGNOSIS.—*Gastrothylacinae* (p. 16): Vas deferens and cephalic half of uterus chiefly or entirely in suctorial field. Testicular fields separate, zones nearly coincide, postcecal or intercecal; vesicula without straight portion. African and Asiatic.

TYPE SPECIES.—*C. gregarius* (Looss, 1896) [*Gastrothylax gregarius* Looss, 1896b, 5-13, 170-177, pl. 1, figs. 1-3].

This group, as at present constituted, contains 5 species which agree in certain characters, and yet are so different that they will certainly submit to further grouping as soon as additional forms become known. At present at least 4, probably 5, subgroups can be more or less clearly foreseen. For the sake of conservatism we will here recognize 5 monotypic subgenera, as follows:

A¹. Genital atrium with very large ventral chamber; testes postcecal:

B¹. Ceca corkscrew like, rather narrow, long, end in fourth zone; testes deeply indented; transverse section of pouch triangular, apex ventrad; vitellaria fine; type *Gastrothylax synethes* Fischæder, in *Bos kerabau*, from Ceylon.

New subg. *Synethes*.

B². Ceca straight, broad, short, end in third zone; testes lobate, very lateral; transverse section of pouch triangular, apex dorsad; vitellaria coarse; type *Gastrothylax gregarius* Looss, in *Bos bubalus*, Egypt, also in *Bos taurus*, East Africa.

New subg. *Carmyerius*.

¹ This genus is dedicated to Miss Caroline Myer, technical clerk in the United States Bureau of Animal Industry, in recognition of the obligation which we feel that helminthologists owe to Miss Myer for her years of faithful work on the Index Catalogue of Medical and Veterinary Zoology.

A³. Genital atrium without ventral chamber; testes post or intercecal:

B³. Ceca straight, narrow, rather long, end in fourth zone; testes lobate, postcecal; transverse section of pouch circular; type *Gastrothylax spatiosus* Brandes, in *Bos taurus*, Arabia New subg. *Gastrothylacis*.

B⁴. Ceca rather sinuous, narrow, long, end in fourth and fifth zones; testes intercecal; transverse section of pouch triangular, apex ventrad; type *Gastrothylax mancupatus* Fischöeder, in *Bos taurus*, East Africa.... New subg. *Gastrothylacides*.

B⁵. Ceca swollen in caudal half, rather long, end in fourth zone; testes inter and postcecal; transverse section of pouch rather triangular, apex ventrad; type *Gastrothylax minutus* Fischöeder, in *Tragelaphus scriptus*, Kamerun, also in *Antilope* sp..... New subg. *Thylogaster*.

WELLMANIUS, new genus.

GENERIC DIAGNOSIS.—*Gastrothylacinae* (p. 16): Vas deferens and cephalic half of uterus chiefly or entirely in suctorial field. Testicular fields separate, zones coincide, testes in inter, extra, and cecal areas, dorsal of ceca; vesicula seminalis consists of a caudal straight and a cephalic coiled portion.

TYPE SPECIES.—*Wellmanius wellmani* new species. Africa.

This new species, new genus, separates out very easily from the other forms of *Gastrothylacidae*. Both the genus and the species are dedicated to the American student of African tropical medicine who sent us the material. The "virtual tautonymy" used here and elsewhere is intentional.

WELLMANIUS WELLMANI, new species.

[Figs. 33 to 42.]

SPECIFIC DIAGNOSIS.—*Wellmanius* (p. 51): 6.5 to 8.25 mm. long, by 3 to 4 mm. broad, more or less conical in form, straight or curved, circular in transverse section, greatest diameter near acetabulum. Surface unarmed, but bluntly pointed cephalic end bears small papillæ. Opening of ventral pouch 0.67 mm. from anterior end; pouch extends to acetabulum; its transverse section triangular (then pentagonal), with apex ventrad; shorter dorsally than ventrally, ventral end extending in acute angle, caudal wall thus not representing a transverse plane. Genital pore at about the equator of the esophagus; genital papilla may be prominent, nearly filling atrium. Acetabulum terminal, 1.7 to 2.5 mm. in diameter, its aperture tilted slightly ventrad. Oral sucker rather pyriform; esophagus, shorter than sucker, bifurcates one-fifth to one-fourth the body length into 2 tortuous wavy ceca which extend to the acetabulum. Excretory system well developed with large vesicle and with thick-walled efferent canal opening dorso-median, caudad of the opening of Laurer's canal.

Male organs: Testes lobate, lateral, in same transverse zone, but their fields are separated by dome of acetabulum and excretory vesicle; vas deferens median; vesicula seminalis, pars musculoosa, pars prostatica, and ductus ejaculatorius well developed.

Female organs: Ovary usually left, shell gland right of median line, between cephalic end of testes; uterus coiled; metraterm straight; Laurer's canal opens median, cephalad of excretory pore; vitellaria extend from slightly caudad of intestinal fork to near termination of ventral pouch; at first (cephalad) the follicles are small, sparse, and scattered, then larger and more numerous, extending ventrad of intestinal ceca and ventral pouch.

Eggs: 112.5 by 60 μ , oval, operculated.

HABITAT.—Lesser Reed Bok (*Cervicapra bohor*), Benguella (type locality), Africa.

TYPE.—U.S.P.H.&M.H.S. 9831, alcoholic material and sections.

SOURCE OF MATERIAL.—This material was sent to us by the American Society of Tropical Medicine. It was collected by Dr. F. C. Wellman in Benguela, West Africa, from the stomach of the Lesser Reed Bok (*Cervicapra bohor*). The sending contains a piece of stomach showing how these trematodes attach themselves to the mucosa.



FIG 33.

EXTERNAL CHARACTERS.

SIZE.—The specimens vary in size from 6.5 to 8.25 mm. in length by 3 to 4 mm. in breadth.

COLOR.—Alcohol specimens are of a buff color.

FORM.—The specimens differ somewhat one from another, but all are more or less conical in form, with the longitudinal axis either straight or more or less curved with the convexity dorsad. The cephalic extremity is rather bluntly pointed and bears the terminal mouth which may be directed slightly dorsad or slightly ventrad. The body is more or less circular in cross section and its greatest diameter is more or less near the caudal extremity which bears a large terminal acetabulum, the terminal circular orifice of which, in some of the specimens, is also tilted slightly ventrad. In some of the specimens the body is somewhat constricted transversely at or slightly caudad of the equator (figs. 33, 34).

SURFACE.—The surface cuticle is devoid of spines or hooks, but is marked by fine transverse sulci and at the oral extremity it is sparsely beset by bluntly rounded papillæ. It is marked at one point, a little (0.675 mm. in one series of sections) below the oral margin, by a small transverse slit, which is the aperture of the ventral pouch and indicates the position of the venter of the animal. Immediately above this slit the surface over a circumscribed area is slightly depressed (see figs. 33, 34).

Ventral pouch.—The ventral pouch extends from its aperture, which is situated a little (0.675 mm. in a sagittal section) below the level of the oral margin to a little above the level of the upper margin of the acetabulum. In transverse sections the form and dimensions of its lumen vary greatly at different levels and to a considerable extent in different specimens. The aperture lies in a slight depression of the venter. It is crescentic and more or less slit like in form (fig. 37), measuring 0.39 mm. from horn to horn in one of the sectioned specimens. A little below the level of the genital pore, which is on



FIG. 34.

the dorsal wall of the pouch, the outline in transverse sections is found to have become changed from the crescentic slit to nearly a triangular form with the apex ventrad (fig. 38).

In its further course caudad the triangular lumen of the pouch gradually shifts toward the axial region of the body which it then comes to occupy. Coincident with this shifting of position there is a further change of outline, the triangular form becoming more or less pentagonal but with the apex still directed ventrad (fig. 39). At first the caliber of the lumen of the pouch increases, but as the fundus of the pouch is approached, its ventro-dorsal diameter becomes rapidly contracted because the fundus instead of occupying a horizontal (transverse) plane occupies a plane which is directed obliquely caudo-ventrad, the dorsal wall of the pouch being shorter than the ventral; in consequence of this, the outline of the pouch in sagittal section is somewhat that of a triangle with its apex at the entrance of the pouch (fig. 35). The lining of the pouch is a cuticle in anatomical continuation with that of the surface and appears to be in irregular longitudinal and transverse folds, producing an appearance somewhat suggestive of papillæ in sections. In the specimens sectioned, the pouch contained some granular matter and a few eggs.

Genital pore.—On the dorsal wall of the pouch a little (0.375 mm. in one sagittal section) below its aperture and in about the equator of the esophagus is the genital pore. This pore is at the vertex of a somewhat flattened hemispherical bulging. In a sagittal section of one specimen this bulging measured 0.40 mm. in its longitudinal diameter. The genital pore leads into a chamber which is almost completely filled by a papilla (genital). In one sectioned specimen a part of this papilla protruded into the ventral pouch through the pore, its margin closely embracing and somewhat constricting it (fig. 35).

Acetabulum.—This muscular organ of adhesion occupies the caudal extremity and its aperture, which is more or less circular, is in the axial line with a slight tilt ventrad in some of the specimens. The diameter of the acetabulum varied from 1.7 to 2.5 mm. in the specimens in which it was measured. The ventro-dorsal diameter of the aperture in one specimen measured 0.40 mm.

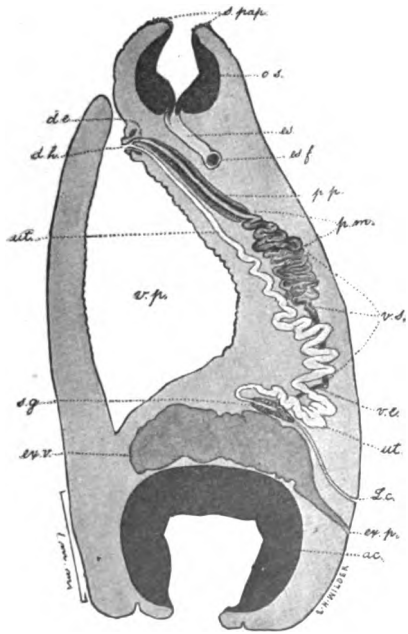


FIG. 35.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The bluntly pointed cephalic extremity is pierced by the more or less circular mouth which leads directly into a very muscular, somewhat pyriform, oral sucker. In cross (transverse) section the outline of the sucker varies in different specimens from an ellipse to a circle. The oral pole of the sucker extends to the surface where it forms a ring around the oral aperture, being marked off from the general body surface by a narrow more or less deep encircling groove (fig. 40). Inclosing the sucker is a space which is traversed, dorsally and ventrally, by dorso-ventral strands. At the esophageal

end the sucker is attached to the body parenchyma so that the organ is anchored at both its poles.

The lumen of the sucker, when studied in transverse sections, is circular in outline at its oral end, becoming somewhat spindle shaped in the equatorial region; beyond this region the lumen at first becomes dorso-ventrally contracted, forming a transverse slit; this eventually becomes reduced to a small circular orifice at the entrance into the esophagus. It is lined by a thin cuticle-like layer, anatomically continuous with that of the surface, and it is beset by small more or

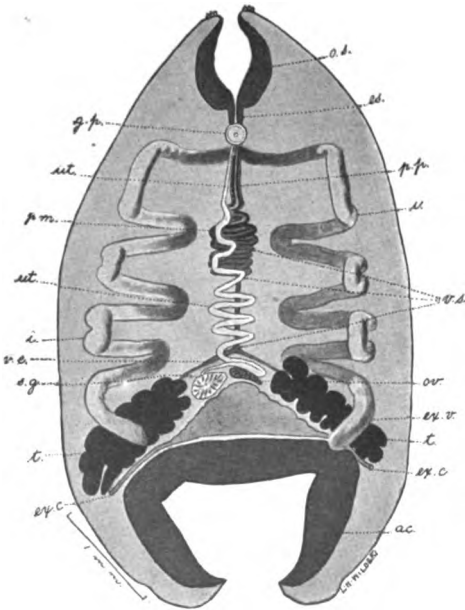


FIG. 36.

less conical papillæ; these papillæ are sparsely scattered in the region of the mouth but numerous and closely aggregated in the remaining portion (figs. 37, 40). From its origin at the base of the sucker the esophagus passes caudo-dorsad; at a point a little less than one-fifth to one-fourth the body length from the oral margin it forks into two intestinal ceca. The esophagus is somewhat shorter than the sucker.

From their point of origin the intestinal ceca, without giving off any branches, pass at first latero-caudad, then having reached the dorso-lateral region of the body they take a dorso-ventrally wavy course caudad to terminate ventrad of the corresponding testis at or a little above the level of the upper margin of the acetabulum (fig. 36, 41).

The lumen of the esophagus is lined by a thick layer of cuticle. At the point of origin of the intestinal ceca the cuticular lining is

eter, and loses its prostatic cells; it now continues as the ductus ejaculatorius. The latter enters the genital papilla, and unites with the metraterm to form the short ductus hermaphroditicus, which opens at the vertex of the papilla as the porus hermaphroditicus (fig. 35).

Female organs.—The ovary and the shell gland are in the caudal portion of the body, but further than this considerable variation was observed in their position and their relation to each other and to the excretory vesicle. This was thought to be dependent in part on the degree of distention of the excretory vesicle. The ovary lies immediately to the right or to the left of the median sagittal plane, cephalo-

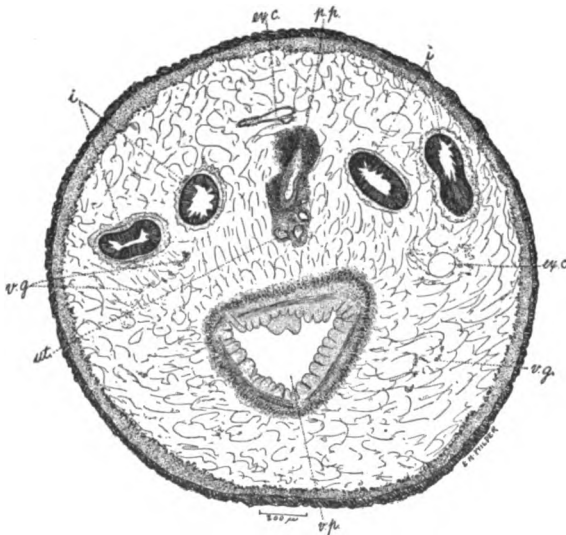


FIG. 38.

specimens it was to the left of the median plane; in the fourth it was to the right. In 3 of the 4 specimens the ovary was close to the dorsal portion of the cephalic aspect of the excretory vesicle (fig. 35), rather than dorsally of the body of the vesicle. With respect to its relation to the acetabulum, it was found that while in 3 of the 4 specimens the ovary was cephal-

ad of the dome of the acetabulum, with the excretory vesicle interposed (fig. 36), in the fourth series of sections the ovary was distinctly below (caudad of) the transverse plane of the superior margin of the acetabulum. In all cases it was distinctly nearer the dorsum than the venter. The shell gland lies close to the right or to the left and more or less cephalad of the ovary, in one instance, cephalo-ventrad of the ovary. Both organs vary in form in the different specimens; for the most part they are somewhat flattened, oblong bodies, but may appear pyriform or subglobular. The ovary is somewhat the larger of the two. From the aspect of the ovary nearest the shell gland the oviduct arises and passes to the shell gland, which it penetrates. Just before entering the latter it gives off Laurer's canal. In the shell gland it is at once joined by the vitello-duct; the common duct so formed then dilates some-

what to form the ootype and beyond this point the canal is continued as the uterus, which emerges from the shell gland at the ventro-cephalic aspect. The uterus then winds its way dorsad over the shell gland; a coil of it forms a loop which is tucked in between the dorsum, on the one hand, and the shell gland and the ovary on the other, before beginning its course cephalad. In the first part of its course cephalad it is included between the two vasa efferentia, but passes ventrad beneath the arch formed by their union to gain the ventral aspect of the vas deferens. It maintains this ventral relation to the vas deferens and its terminal portion, pars prostatica, etc., in the remainder of its course to the genital papilla. As already mentioned, it opens near the vertex of the latter into a short duct (ductus hermaphroditicus) common to it and the ductus ejaculatorius.

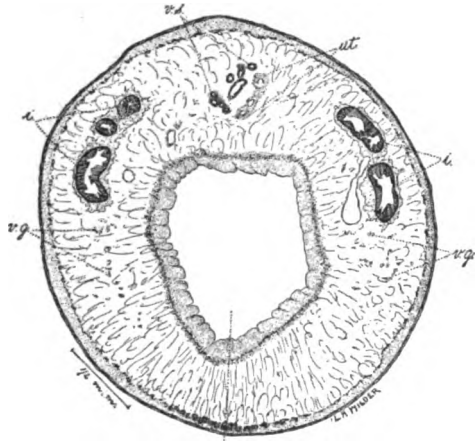


FIG. 39.

Numerous eggs were observed filling the loops here and there and, near the shell gland, some of the loops contained masses of spermatozoa.

Laurer's canal passes from its point of origin dorso-caudad to open in the median line slightly below the upper margin of the acetabulum and a little above the excretory pore. The canal is long and slender; it is lined by a thick cuticle in anatomical continuation with the cuticle of the surface, and its lumen may contain cells resembling those in the vitelloducts. Receptaculum seminis is wanting.

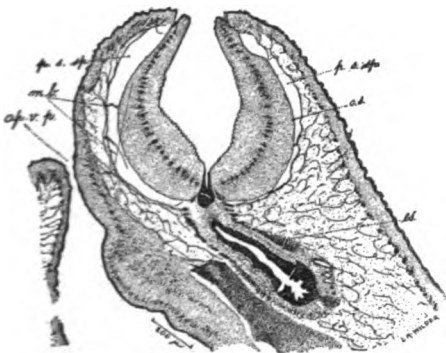


FIG. 40.

The vitellaria begin in a transverse plane somewhat caudad of the esophageal bifurcation. At first there are a few small scattered follicles ventrad of the intestinal ceca, but gradually follicles appear which are larger and somewhat more numerous and scattered close around and ventrally of the

intestinal ceca and ventral pouch. They extend caudad to a plane slightly above (cephalad of) the termination of the ventral pouch; at about this point and ventro-centrad of the intestinal ceca, the vitello-ducts arise, and each passes medio-dorso-caudad or caudad

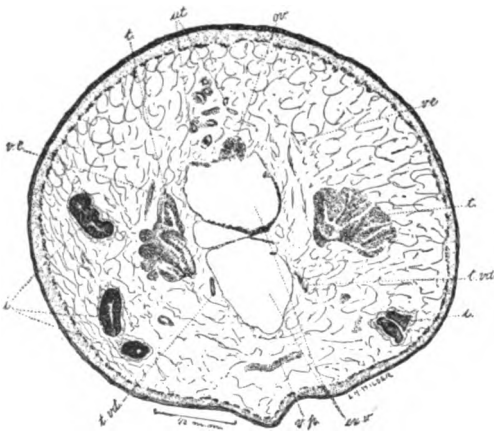


FIG. 41.

Eggs.—The eggs are oval in outline and provided with a small operculum at one end. We found some difficulty in obtaining them in a condition satisfactory for measurement. One egg measured 112.5 by 60 μ .

EXCRETORY SYSTEM.—The excretory vesicle, when distended, is of considerable size. It lies immediately above the acetabulum and between the two testes. Its ventro-dorsal diameter is about equal to the corresponding diameter of the acetabulum. It receives on either side, at about

its ventro-lateral aspect, a large excretory canal, which may be observed to wind its way from the cephalic portion of the body caudad on the ventro-lateral aspect of the corresponding testis, then beneath the latter to its destination. From the dorso-caudal aspect of the vesicle a thick-walled canal arises, which after a

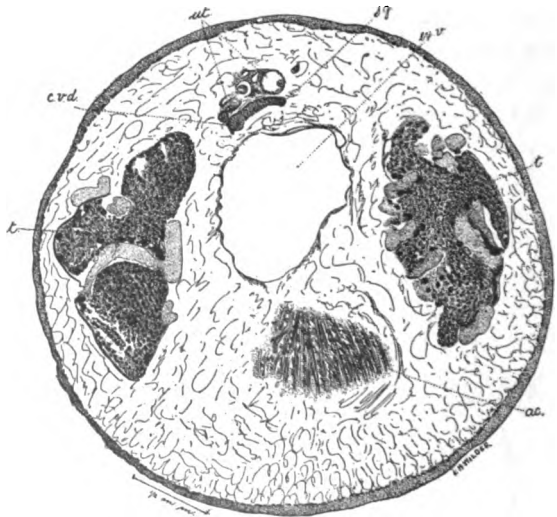


FIG. 42.

short course caudo-dorsad opens on the dorsal surface at the excretory pore a little below the opening of Laurer's canal (fig. 35).

ILLUSTRATIONS.

FIG. 33.—External appearance, ventral view. Enlarged. Original.

FIG. 34.—External appearance, ventral view. Enlarged. Original.

FIG. 35.—Diagrammatic sagittal section, showing internal anatomy: *ac.*, acetabulum; *d. e.*, ductus ejaculatorius; *d. h.*, ductus hermaphroditicus; *es.*, esophagus; *es. f.*, esophageal fork; *ex. p.*, excretory pore; *ex. v.*, excretory vesicle; *i.*, intestinal ceca; *L. c.*, Laurer's canal; *o. s.*, oral sucker; *p. m.*, pars musculosa; *p. p.*, pars prostatica; *s. g.*, shell gland; *s. pap.*, surface papillæ; *v. e.*, vasa efferentia; *v. p.*, ventral pouch; *v. s.*, vesicula seminalis; *ut.*, uterus. Enlarged. Original.

FIG. 36.—Diagrammatic frontal section shows internal anatomy: *g. p.*, position of genital pore; *ex. c.*, excretory canals; *ov.*, ovary; *t.*, testes. For other abbreviations see fig. 35. Enlarged. Original.

FIG. 37.—Transverse section at level of aperture of ventral pouch. Shows form of body, aperture of ventral pouch (*a. v. p.*), oral sucker (*o. s.*), papillæ of suctorial lumen (*pap. o. s.*), and the perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 38.—Transverse section slightly caudad of level of genital pore. Shows form of body, triangular outline of ventral pouch (*v. p.*) at this level the intestinal ceca (*i.*) and their relation to the ventral pouch, to pars prostatica (*p. p.*) and uterus (*ut.*), excretory canals (*ex. c.*) and vitellaria (*v. g.*). Enlarged. Original.

FIG. 39.—Transverse section at about the junction of the second with the equatorial fifth of the body length. Shows form of body, irregularly pentagonal form of ventral pouch (*v. p.*), intestinal ceca (*i.*), vesicula seminalis (*v. s.*), uterus (*ut.*), and vitellaria (*v. g.*) Enlarged. Original.

FIG. 40.—Sagittal section showing oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), mesenterium-like strands (*m. b.*), esophagus (*es.*), and aperture of ventral pouch (*ap. v. p.*). Enlarged. Original.

FIG. 41.—Transverse section immediately cephalad of superior margin of acetabulum shows the laterally placed testes (*t.*) separated by the excretory vesicle (*ex. v.*) and the position and relation of the (caudal portion of the) ovary (*ov.*), uterus (*ut.*), vasa efferentia (*v. e.*), intestinal ceca (*i.*), transverse vitello-ducts (*t. vd.*) and caudal terminal portion of ventral pouch (*v. p.*). Enlarged. Original.

FIG. 42.—Transverse section immediately below superior margin of acetabulum. Shows the laterally placed testes (*t.*) separated by

the acetabulum (*ac.*) and excretory vesicle (*ex. v.*). Shows also the shell gland (*s. g.*), uterus (*ut.*), and common vitello-duct (*c. vd.*). Enlarged. Original.

Family PARAMPHISTOMIDÆ Fischæder, 1901, restricted.

FAMILY DIAGNOSIS.—*Paramphistomoidea* (p. 15): Ventral pouch absent.

TYPE GENUS.—*Paramphistomum* Fischæder, 1901.

The family *Paramphistomidæ* Fischæder, 1901, is here restricted to the forms without a ventral pouch. Our work is based primarily upon the amphistomes of mammals, but it seems not entirely excluded that further study of the amphistomes of other vertebrates may result in a further restriction of the family to forms in which the oral sucker is without an evagination.

Fischæder (1901a), in writing upon species found in mammals, recognized 2 subfamilies for *Paramphistomidæ*, namely, *Paramphistominæ* and *Cladorchinæ*. Cohn (1904), in dealing with species found in amphibians and reptiles, recognized the subfamily *Diplodiscinæ* for three genera, but he did not compare his forms with the forms discussed by Fischæder. Daday (1907) later described forms from fish, classifying some of them near some of the forms described by Fischæder, others in *Diplodiscus*, but he did not enter into a discussion of the classification of the subfamilies. Disregarding the new genera proposed in the present paper, the classification stands at present as follows:

Paramphistomidæ Fischæder, 1901.

Paramphistominæ Fischæder, 1901.

Paramphistomum Fischæder, 1901.

Stephanopharynx Fischæder, 1901.

Gastrothylax Poirier, 1883.

Cladorchinæ Fischæder, 1901.

Cladorchis Fischæder, 1901.

Subg. *Cladorchis* Fischæder, 1901.

Subg. *Taxorchis* Fischæder, 1901.

Subg. *Stichorchis* Fischæder, 1901.

Microrchis Daday, 1907.

Pseudocladorchis Daday, 1907.

Pseudodiscus Sonsino, 1895.

Gastrodiscus Leuckart, 1877.

Homalogaster Poirier, 1883.

Diplodiscina: Cohn, 1904.

Diplodiscus Diesing, 1836.

Catadiscus Cohn, 1904.

Opisthodiscus Cohn, 1904.

Subfamily not given.

Balanorchis Fischæder, 1901.

When we consider the status of this group prior to 1901, the great advance in our knowledge which we owe to Fischæder must be immediately recognized, and this advance has been further supported,

especially by Cohn and Daday. That the classification as it now stands is not final lies in the nature of things; and on account of the fact that definite data are lacking in the case of many species it must be expected that in the future rather radical changes may perhaps be necessary. In the immediate future, changes are more or less experimental, though they may appear justified.

Gastrothylax should, we believe, be placed in a separate family (see p. 16).

Stephanopharynx presents such a striking character in its circular evagination of the oral sucker that it seems wise to separate it entirely from *Paramphistominæ*; but if left in this subfamily, it should at least be placed in a tribe distinct from *Paramphistomum*.

Gastrodiscus and *Homalogaster* are so different from the other members of *Cladorchiinæ* that they should either be placed in a distinct subfamily or in a distinct family.

Diplodiscinæ will probably be justified as a distinct subfamily, or at least as a distinct tribe, but further data are desirable in regard to its genera.

Balanorchis is placed with difficulty. It probably represents a distinct subfamily; if classified in *Cladorchiinæ*, it should represent a distinct tribe.

It is exceedingly difficult at present to draft a key representing the natural relations of members of this family, but the following key, admittedly more or less artificial, will be found of use in tracing the genera. This key is based primarily upon the type species:

KEY TO THE KNOWN AND NEW GENERA OF PARAMPHISTOMIDÆ S. STR.

- A¹. Oral sucker without evagination [this probably represents a distinct subfamily *Paramphistominæ*, p. 62]; cirrus pouch absent; body not divided; ovary not pretesticular [eventually these may be tribal or subtribal characters]:
 - B¹. Genital sucker absent; type *cervi*.....*Paramphistomum*, p. 73.
[For subgenera, see p. 74.]
 - B². Genital sucker present; type *cotylophorum*.....*Cotylophoron*, p. 63.
- A². Oral sucker with evagination:
 - B³. Evagination circular [this will probably prove to be of supergeneric value, indicating a subtribe or tribe, probably a subfamily, *Stephanopharynginæ*]; genital sucker and cirrus pouch absent, body not divided [these characters will probably prove to be supergeneric]; type *compactus*.
Stephanopharynx, p. 168.
 - B⁴. Evagination paired [if of subfamily value, this unites *Cladorchiinæ* and *Diplodiscinæ* in one subfamily; later investigations may show that these groups can be separated on the excretory system, cf. *Diplodiscus*]:
 - C¹. Genital sucker present; testes clearly branched:
 - D¹. Vitellaria entirely posttesticular; testicular zones coincide, preequatorial, widely separated from acetabulum, fields separate; uterus of unusual course, first runs near dorsum cephalad to testes, then diagonally caudad near venter, then cephalad near venter to pore; type *schistocotyle*.
Tazorchis, p. 170.
 - D². Vitellaria not entirely posttesticular; testes in equatorial third; uterus not as in *Tazorchis*; type *pyriformis*.....*Cladorchis*, p. 169.

C². Genital sucker absent; testes lobate or lobulate:

D³. Cirrus pouch absent:

E¹. Each oral evagination single (only pouch present), type *watsoni*.

Watsonius, p. 212.

E². Each oral evagination double (pouch and bulb present), type *stanleyii*.

Pseudodiscus, p. 170.

D⁴. Cirrus pouch present [perhaps in part a special subfamily, see *Diplodiscinae*, p. 247]:

E³. Acetabulum divided into two parts by constriction; one testis present; esophagus with muscular swelling at bifurcation; type *dolichocotyle*.

Catadiscus, p. 248.

E⁴. Acetabulum with central projecting sucker; two testes present; esophagus without muscular swelling; type *diplo-discoides*.

Opisthodiscus, p. 248.

E⁵. Acetabulum cavity with prominent papillæ; excretory system does not enter acetabulum; testes preovarial, at least not postovarial; evaginations of sucker well developed, at least not confined to wall; esophagus without pronounced muscular thickening; testicular zones coincide; excretory pore vesicular, type *papillatus*.....*Pfenderius*, p. 232.

E⁶. Acetabulum otherwise:

F¹. Excretory system branches radially in acetabulum [perhaps special subfamily *Diplodiscinae*, with *Diplodiscus*, *Catadiscus*, *Opisthodiscus*]; testes coalesce in adult; esophagus with muscular swelling at bifurcation; type *subclaratus*.....*Diplodiscus*, p. 248.

F². Excretory system does not appear to enter acetabulum:

G¹. Testes postovarial, portuterine, postequatorial; type *anastrophus*.

Balanorchis, p. 247.

G². Testes preovarial, at least not postovarial:

H¹. Evaginations of sucker not well developed, confined to wall of sucker; sucker with two phincters; type *cylindricus*.

Pseudocladorchis, p. 232.

H². Evaginations of sucker well developed, at least not confined to wall; sucker with one sphincter; esophagus with muscular thickening; testicular zones separate; excretory pore pre-vesicular:

I¹. Testes not lobate; excretory pore equatorial; type *megacotyle*.

Microrchis, p. 246.

I². Testes 4-lobate; excretory pore postequatorial, posttesticular, with powerful sphincter; type *fabaceus*....*Chiorchis*, p. 246.

Subfamily PARAMPHISTOMINÆ, restricted.

SUBFAMILY DIAGNOSIS.—*Paramphistomida* (p. 60): Oral sucker without evagination.

TYPE GENUS.—*Paramphistomum*.

There seems every indication that the group here defined will represent a subfamily.

Additional characters for the two known genera are: Cirrus pouch absent, ovary not pretesticular, excretory system does not enter acetabulum.

As additional genera become known, these characters may result in dividing the subfamily into tribes and subtribes.

The two known genera may easily be distinguished as follows:

Genitalsuckerabsent; type *cervi*.....*Paramphistomum*, p. 73.

Genital sucker present; type *cotylophorum*.....*Cotylophorum*, p. 63.

COTYLOPHORON, new genus.

GENERIC DIAGNOSIS.—*Paramphistominæ* (p. 62): Esophagus with or without muscular thickening; ceca long, wavy, end in acetabular zone. Acetabulum of moderate size, terminal, tilts ventrad. Excretory vesicle and canal directed cephalad; excretory pore prevesicular. *Genital sucker present, genital papilla present, ventral chamber of genital atrium absent.*

Male organs: Testes smaller than acetabulum, lobate, immediately preacetabular, zones overlap slightly, fields nearly coincide, crossing median line.

Female organs: Ovary ventral of excretory vesicle; Laurer's canal crosses excretory vesicle; its pore opens caudad and laterad of excretory pore, in acetabular and vesicular zones.

TYPE SPECIES.—*Cotylophoron cotylophorum* (Fischæder, 1901).

Thus far, two easily separated species may be classified in this genus. They are distinguished as follows:

Esophageal muscular thickening present; genital pore bifurcal; body 5 to 8 mm. long; type hosts: *Bos taurus*, Togo; *Bos taurus indicus*, German East Africa.

C. cotylophorum, p. 63.

Esophageal muscular thickening absent; genital pore postbifurcal; body, 4.3 to 5.5 mm. long; type host: *Ovis aries*, India.....*C. indicum*, p. 63.

Species COTYLOPHORON COTYLOPHORUM (Fischæder, 1901) Stiles & Goldberger, 1910.

1901: *Paramphistomum cotylophorum* Fischæder, 1901a, 370 (stomach of *Bos taurus*, Togo; *Bos zebu*, German East Africa).

1909: *Cotylophoron cotylophorum* (Fischæder, 1901) Stiles & Goldberger, 1910a, 63. For full bibliography, see Stiles & Hassall, 1908, Index Catalogue, etc., Trematoda.

COTYLOPHORON INDICUM, new species.

[Figs. 43 to 52.]

SPECIFIC DIAGNOSIS.—*Cotylophoron* (p. 63): Body 4.3 to 5.5 mm. long by 1.5 to 2 mm. broad; color (in glycerine alcohol) faint brown tint; slender, conical in form, greatest breadth near caudal extremity; tapers to bluntly pointed oral extremity; longitudinal axis curved, concavity ventrad; dorsum convex longitudinally and transversely, venter concave longitudinally, convex transversely; lateral margins slightly excurvate longitudinally, convex dorso-ventrally; transverse section elliptical. Surface without spines or papillæ except possibly at oral aperture which may (?) bear minute papillæ. Genital pore distinctly postbifurcal, on vertex of slight but not sharply defined bulging about one-third of body length from oral pole, and surrounded by genital sucker. Acetabulum caudal, sunken so that apparent aperture is formed by body, margin not projecting, 1.14 mm. in dorso-ventral diameter, aperture tilted somewhat ventrad, 0.6 mm. in diameter, muscular dome 0.24 mm. thick. Mouth at blunt cephalic extremity; oral sucker pyriform in sagittal section, its lumen papillate, narrow dorso-ventrally, rather broad transversely; maximum measurements of sucker 0.52 mm. long, 0.42 mm. in dorso-ventral and 0.6 mm. in transverse diameter; perisuctorial space roomy; esophagus about two-thirds as long as sucker and curved slightly ventrad; ceca arise from dorso-lateral aspects of end of esophagus, slightly less than one-fourth the body length from oral extremity, at first forming with each other a very acute angle they approach the lateral margins of body, then extend caudad in well-marked dorso-ventrally wavy course to terminate about $\frac{2}{3}$ of body length from mouth, postovarial, in acetabular zone, the left cecum ending slightly caudad of the right; ceca of relatively considerable caliber. Excretory pore dorso-median about at junction of equatorial with caudal third of body, about 0.16 mm. cephalad of acetabulum,

cephalad of caudal margin of caudal testis and about 0.56 mm. cephalad of pore of Laurer's canal; excretory canal short, thick walled, runs caudo-ventrad to well-developed elongate, slightly bag-shaped vesicle, the fundus of which is close to dome of acetabulum, intercecal, at end of ceca.

Male organs: Testes large, but somewhat smaller than acetabulum, irregularly globular, lobate, in median line, cephalad of acetabulum, intercecal, fields nearly coincide, zones overlap; union of vasa efferentia slightly cephalad of cephalic testis; vas deferens coiled; its vesicula seminalis much coiled, dilated; pars musculoosa not coiled, narrow; pars prostatica about as long as musculoosa, directed ventrad; ductus ejaculatorius short, unites with metraterm to form ductus hermaphroditicus, which is 195μ long and opens at porus hermaphroditicus on vertex of cylindrical genital papilla, which is 105μ long, 75μ in diameter; the latter almost fills a chamber 105μ deep, 105μ in diameter; this in turn is surrounded by a hemispherical, sharply defined, muscular genital sucker.

Female organs: Ovary and shell gland in testicular to posttesticular zones, intercecal, sinistral, close to acetabulum in cephalic portion of acetabular zone, shell gland in ovarian and postovarian zones; vitellaria with sparse and scattered, but well-developed follicles, chiefly extra-cecal, extending throughout cecal zone and slightly post-cecal; a few follicles enter also the cecal and intercecal areas; uterus extends from ventral pole of shell gland, runs cephalo-ventrad, forming coils, turns dorsad, skirting the left lateral aspect of the caudal testis, turns cephalad dorsally of this testis, passes dorsally of both testes, ventrad over cephalic margin of cephalic testis, under arch of vasa efferentia, cephalad again ventrally of vas deferens to penetrate genital sucker caudad of penetration of male duct, and unites with latter in wall of genital sucker to form the ductus hermaphroditicus; Laurer's canal passes from oviduct in a curve (convexity cephalad) dorsally, crossing on left aspect of excretory vesicle to left of dorso-median line and opens dorsally of excretory vesicle, about 0.56 mm. caudad of excretory pore.

Eggs: Not observed.

TYPE.—U.S.N.M. 5781.

HABITAT.—In (? organ of) sheep, *Ovis aries*, India.

SOURCE OF MATERIAL.—Six specimens, in bottle of the Hassall Collection bearing the Smithsonian number 5781, were labeled: "*Amphistoma conicum*," host, *Ovis aries*; locality, India; presented May 19, 1886.

EXTERNAL CHARACTERS.

SIZE.—The specimens (in glycerine alcohol) varied in length from 4.3 to 5.5 mm. and in width from 1.5 to 2 mm.

COLOR.—The specimens in glycerine alcohol are of a faint brown tint.

FORM.—The worms are of a slender conical form, broadest near the caudal extremity and tapering to a bluntly pointed attenuated oral extremity. The longitudinal axis is more or less curved, with the concavity directed ventrad. The dorsum is convex longitudinally and transversely; the venter is concave in the longitudinal direction, but convex transversely, its convexity being less marked, however, than the corresponding convexity of the dorsum. The lateral margins are slightly excurvate in the longitudinal direction and convex dorso-ventrally. In transverse section the body of the worm is

elliptical in outline, with a somewhat greater transverse than dorso-ventral diameter.

SURFACE.—The general cuticular surface is smooth; that is, unprovided with spines or papillæ. Around the oral aperture some minute papillæ may be present, but this could not be determined with certainty.

Genital pore.—In the median sagittal line of the venter, about one-third of the worm's length from the oral extremity, there is the genital pore. It is situated at the vertex of a slight but not sharply defined ventral bulging.

Acetabulum.—This is in the caudal extremity, with a terminal though a more or less ventrally tilted aperture. The rim is sunken or more or less retracted beneath the inclosing body surface (fig. 45), so that the (apparent) aperture is formed by the inclosing parenchyma. Measured from a projection of one sectioned specimen (which measured 3.9 mm. in length), the maximum dorso-ventral diameter of the acetabulum was 1.14 mm. and of its aperture 0.60 mm., with a thickness of dome of about 0.24 mm.



FIG. 43.

INTERNAL ANATOMY.

The following description of the internal anatomy is based on a series of transverse sections of one specimen (5781a) which measured 3.90 mm. in length, 1.66 mm. in greatest transverse and 1.42 mm. in greatest dorso-ventral diameter as measured from projections made from the sections.



FIG. 44.

DIGESTIVE TRACT.—The mouth, which pierces the blunted cephalic extremity, leads directly into the oral sucker. The latter is muscular and of a pyriform outline as viewed in median sagittal section. Its maximum dimensions as measured in projection of a series of transverse sections are: Length, 0.52 mm.; dorso-ventral diameter, 0.42 mm.; transverse diameter, 0.60 mm. Its attenuated pole presents the aperture of the mouth and is marked off from the oral surface by a narrow encircling groove (fig. 45). Its broad blunt base gives origin to the esophagus. A roomy space incloses the body of the sucker (fig. 47). The lumen of the sucker is a dorso-ventrally narrow but transversely a rather broad space; it is lined with a cuticle which is beset with short conical papillæ.

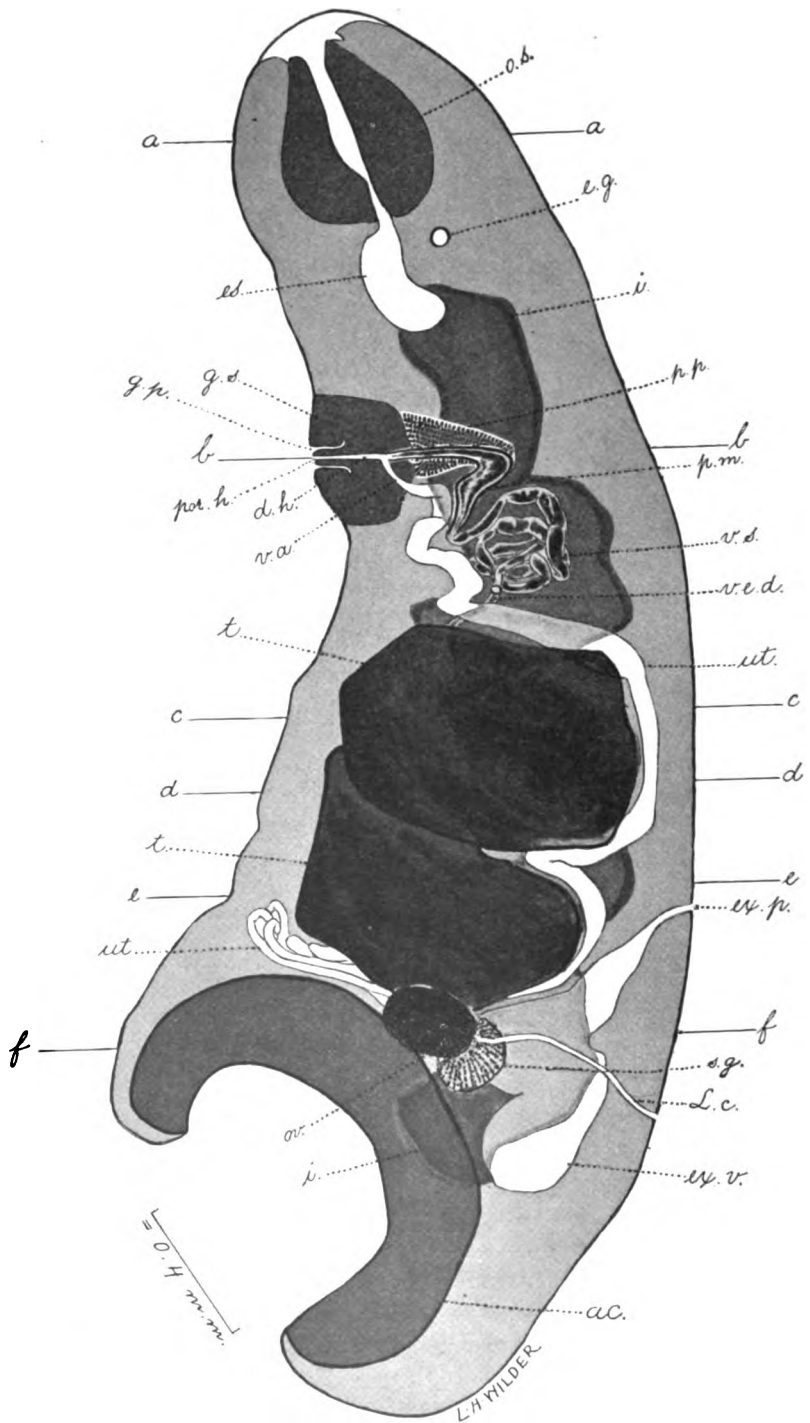


FIG. 45.

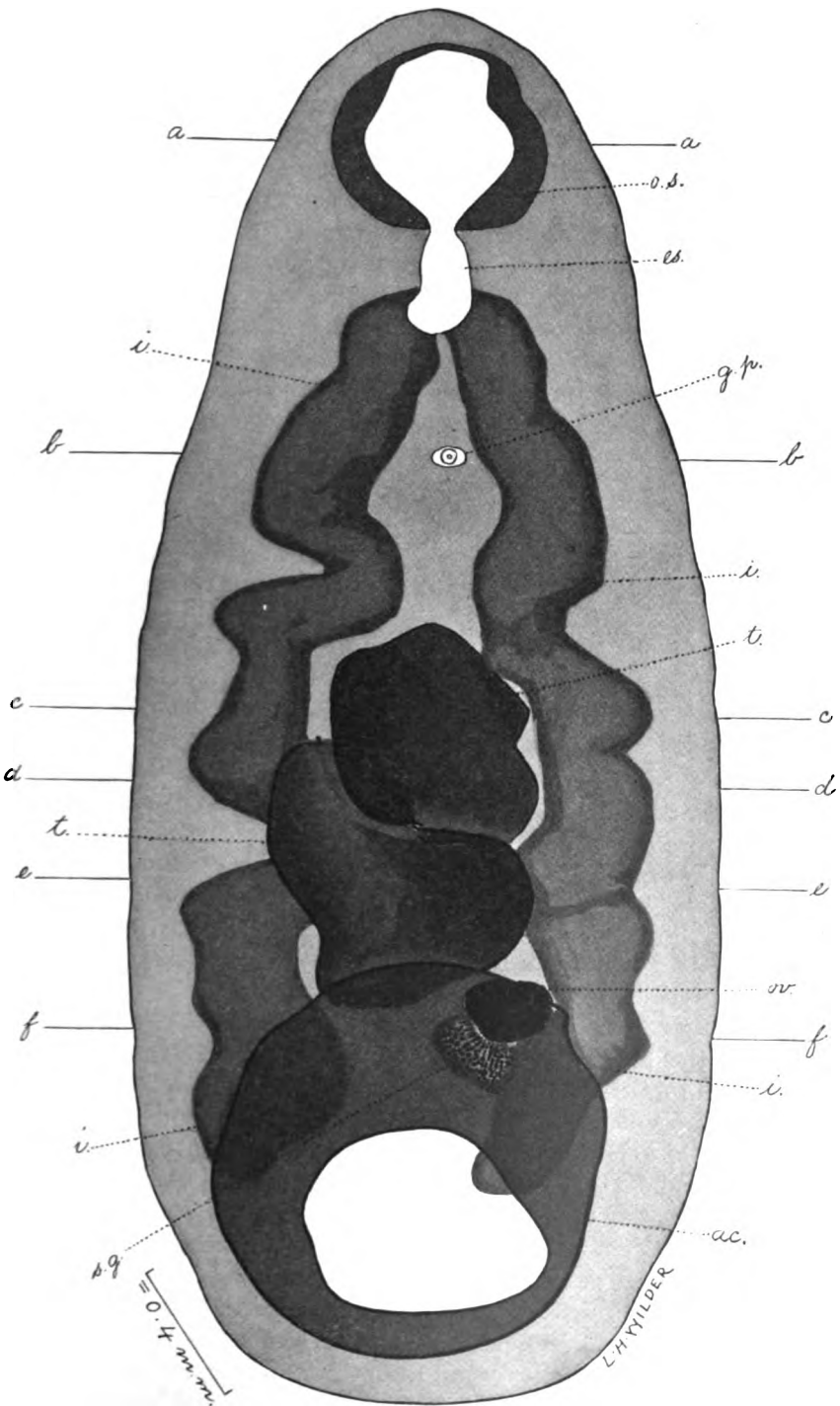


FIG. 46,

The esophagus, from its point of origin at the base of the sucker, passes caudad for a distance equal to about two-thirds the length of the sucker, where it gives off the intestinal ceca from both dorso-lateral aspects. The esophagus describes a slight curve ventrad. Its walls are thick and its lumen is lined with a thick cuticular layer. Dorsally of the first part of the esophagus there is a transverse nervous cord (fig. 45).

The intestinal ceca take their departure from the esophagus at a point slightly less than one-fourth the body length from the oral extremity. At their origin they form a very acute angle one with the other. The ceca at first approach the lateral margins of the body, then pass caudad in a well-marked dorso-ventrally wavy course, to terminate cecally at about the junction of the fifth with the caudal sixth of the body length; the right intestinal cecum terminates at a slightly

higher (more cephalic) level than the left. The ceca are of relatively considerable caliber and are lined by a layer of epithelium.

GENITAL SYSTEM.—*Male organs.*—The two testes are in the axial region of the body, one caudad of the other, but the caudally placed testis presents a

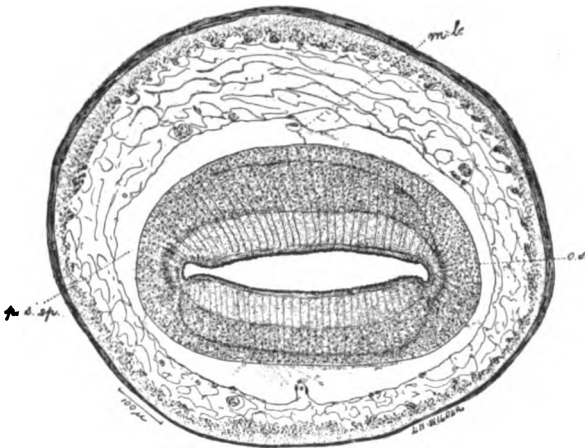


FIG. 47.

cephalic lobe which overlaps the caudal portion of the right ventro-lateral aspect of the cephalic testis. The two testes occupy a zone immediately cephalad of that of the acetabulum and equal to one-fourth of the body length of the worm. The testes are irregularly globular in form and are indented by fissures marking off numerous lobes on their surface. Each testis gives origin to a vas efferens; that from the cephalic testis springs from its left dorsal aspect (fig. 49), while that of the caudal testis springs from its dorso-cephalic aspect (fig. 51). The vas from the cephalic testis at first passes cephalad close to the left lateral aspect of the testis from which it springs, later it passes cephalo-dorsad and toward the median line, arching over the testis and the uterus to unite with its fellow of the right side (from the caudal testis) to form the vas deferens. The right vas efferens, after its origin from the caudal testis, passes at first to the right and cephalad (dorsally of the cephalic lobe of the caudal

testis) to gain the right lateral aspect of the cephalic testis at some slight distance from which it ascends cephalad, eventually arching over the cephalic testis and the uterus to unite, as already described, in forming the vas deferens. The first part of the vas deferens is a much coiled, thin-walled, dilated duct (vesicula seminalis), distended with spermatozoa. This is abruptly succeeded by a narrow, thicker, and more muscular walled uncoiled part (pars muscosa), which ascends cephalad for a short distance, when it in turn is succeeded by a portion which is inclosed in a thick layer of cells. This portion (par prostatica) passes directly ventrad, and after a course about equal in length to the muscosa it penetrates the genital sucker. Here the prostatic cells cease and the continuation of the duct may be regarded as the ductus ejaculatorius. This joins near the base of the genital papilla

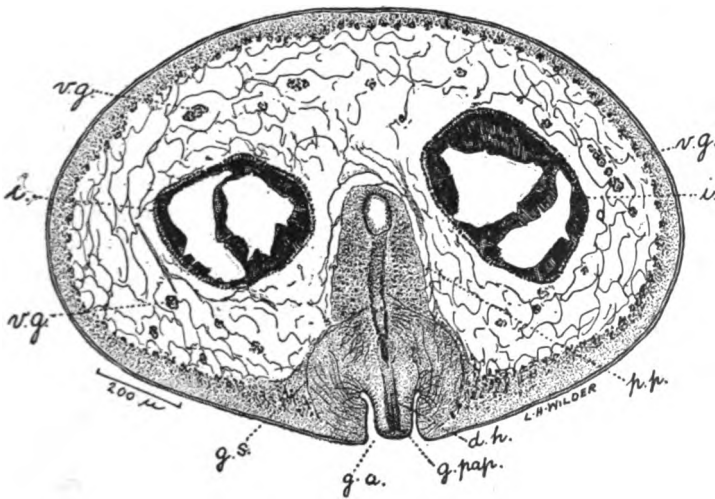


FIG. 48.

with the terminal portion of the uterus to form the ductus hermaproditicus which is 195μ long and pierces the axial region of the genital papilla. The copulatory apparatus presents the genital pore in the median line of the venter at about the junction of the cephalic with the equatorial third of the body and considerably caudad of the esophageal fork (figs. 45, 48). This pore leads into a cylindrical chamber 105μ in depth and about 105μ in diameter, that is almost entirely filled by a cylindrical genital papilla, which, arising from the dorsal wall of the chamber, projects forward (ventrad) into it. The papilla, measured in transverse section, was 75μ in diameter and 105μ in length. Inclosing this genital atrium is a muscular mesh presenting somewhat the form of a hemisphere and in outline suggestive of a sucker. The genital atrium may be regarded as the cavity of the sucker and the genital pore as its aperture. It presents a sharply

defined limiting layer delimiting it from the body parenchyma (fig. 48).

Female organs.—The ovary is in the caudal portion of the body to the left of the median sagittal plane, close to the dome of the acetabulum and immediately

caudad of the cephalic margin of the acetabulum. The oviduct takes origin from the dorsal aspect of the ovary and at first passes directly caudad. It then bends and passes to the right toward the shell gland, which it penetrates, but giving off Laurer's canal just before it does so.

Immediately after entering the shell gland it unites with the common vitello-duct to form a fusiform ootype, which is directed obliquely from the left and dorsally to the right and ventrally to be continued as the uterus. Laurer's canal passes dorsad close to the left aspect of the excretory vesicle to reach the dorsum at a point to the left of the median line and about 0.56 mm. caudad of the excretory pore.

The shell gland lies in close apposition to the right side of the ovary; their zones are, however, not identical but overlap, that of the ovary being a little the more cephalad of the two. On account of this rela-

tion to the ovary, the shell gland lies just to the left of the median sagittal plane and of the excretory vesicle, which at this level is crowded over to the right. As already stated the shell gland is penetrated by the oviduct, the point of penetration corresponding to the dorsal pole of the gland. It is also penetrated by the common vitello-duct, the point of penetration being close to but a little caudad

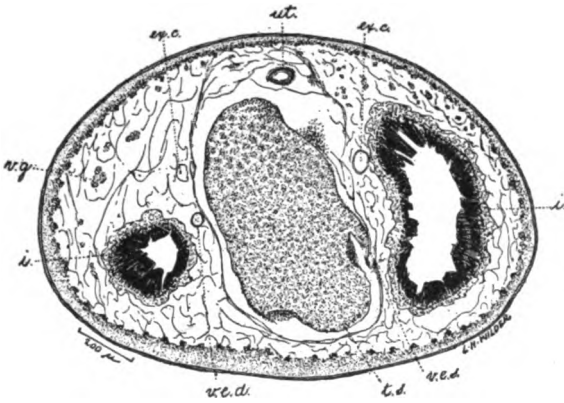


FIG. 49.

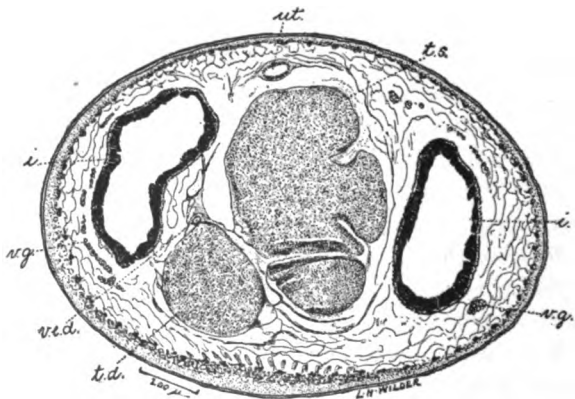


FIG. 50.

FIG. 51.

The vitellaria, consisting of sparsely scattered but well-developed follicles, are placed in the extracecal fields; longitudi-

nally they are coextensive with the cecal zone, though a few follicles are found slightly caudad of this zone, and not only in the extracecal fields but also in the cecal and intercecal areas.

Eggs.—Eggs were not observed in the uterus.

EXCRETORY SYSTEM.—The excretory system is well developed. A well-developed excretory vesicle lies in the caudal portion of the body. It is in the form of an inverted elongate pouch, the fundus of the vesicle being close to the dome of the acetabulum in the intercecal field at the level of the cecal ends of the intestines. The body of the

vesicle extends cephalad and toward the dorsum, its diameters in transverse section becoming progressively smaller. Eventually it gives place to a short, thick walled duct, which opens in the median line of the dorsum at about the junction of the equatorial with the caudal third of the body length and about 0.16 mm. cephalad of the transverse plane of the cephalic margin of the acetabulum and slightly cephalad of the level of the caudal margin of the caudal testis.

RELATION TO OTHER SPECIES.

Cotylophoron indicum comes close to *C. cotylophorum*, from which it differs chiefly in the structure of the esophagus, which is provided with a bulbus thickening in the latter species but is without it in the

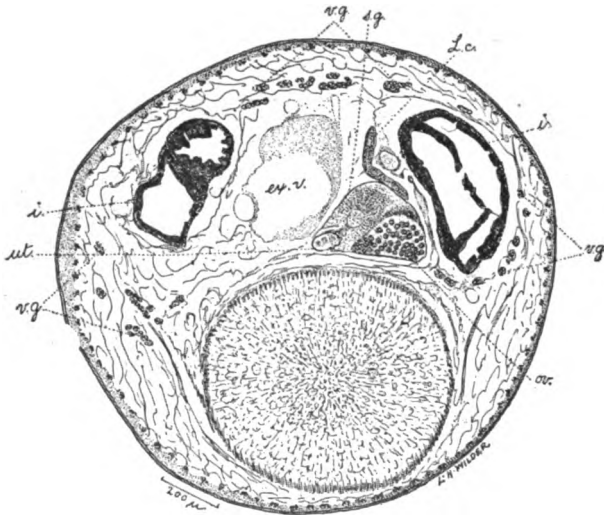


FIG. 52.

former. The two differ also in the details of structure of the copulatory apparatus and in the position of the genital pore. In *C. indicum* the genital sucker is less sharply delimited, projects less, has a much smaller genital atrium, and the genital pore is decidedly postbifurcal; on the other hand, in *C. cotylophorum* the genital sucker is sharply marked, with rim prominently bulging the venter, with a relatively roomy genital atrium and with the genital pore in the bifurcal zone.

ILLUSTRATIONS.

FIG. 43.—Profile view. Enlarged. Original.

FIG. 44.—Ventral view. Enlarged. Original.

FIG. 45.—Profile projection of same, showing oral sucker (*o. s.*), esophagus (*es.*), esophageal ganglion (*e. g.*), right intestine (*i.*), genital sucker (*g. s.*), testes (*t.*), right vas efferens (*v. e. d.*), vesicula seminalis (*v. s.*), pars muscosa (*p. m.*), pars prostatica (*p. p.*), ductus herma-

phroditicus (*d. h.*), porus hermaphroditicus (*por. h.*), genital pore (*g. p.*), metraterm (*va.*), uterus (*ut.*), shell gland (*s. g.*), ovary (*ov.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), and acetabulum (*ac.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 46.—Ventral projection of same. Lettering as in fig. 45. Slightly diagrammatic. Enlarged. Original.

FIG. 47.—Transverse sections at *a-a*, figs. 45 and 46. Shows oral sucker (*o. s.*) with the papillæ lining the lumen, perisuctorial space (*p. s. sp.*), and mesenterial band (*m. b.*). Enlarged. Original.

FIG. 48.—Transverse section at *b-b*, figs. 45 and 46. Shows genital atrium (*g. a.*), genital papilla (*g. pap.*), genital sucker (*g. s.*), ductus hermaphroditicus (*d. h.*), pars prostatica (*p. p.*), intestinal ceca (*i.*), vitellaria (*v. g.*). Enlarged. Original.

FIG. 49.—Transverse section at *c-c*, figs. 45 and 46. Shows form of body at equator, cephalic testis (*t. s.*), origin of left vas efferens (*v. e. s.*), position of the right vas efferens (*v. e. d.*), uterus (*ut.*), intestinal ceca (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 50.—Transverse section at *d-d*, figs. 45 and 46. Shows caudal portion of cephalic testis (*t. s.*), and cephalic lobe of caudal testis (*t. d.*), right vas efferens (*v. e. d.*), uterus (*ut.*), intestinal ceca (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 51.—Transverse section at *e-e*, figs. 45 and 46. Shows caudal testis (*t. d.*), origin of right vas efferens (*v. e. d.*), uterus (*ut.*), intestinal ceca (*i.*), vitellaria (*v. g.*), and excretory canals (*ex. c.*). Enlarged. Original.

FIG. 52.—Transverse section at *e-e*, figs. 3 and 4. Shows ovary (*ov.*), shell gland (*s. g.*), first part of uterus (*ut.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), intestinal ceca (*i.*), vitellaria (*v. g.*), and acetabulum (*ac.*). Enlarged. Original.

Genus PARAMPHISTOMUM, Fischöder, 1901.

GENERIC DIAGNOSIS.—*Paramphistominae* (p. 62): Body tends to a conical form, with convex dorsum and concave venter, rather attenuate cephalad, rather blunt caudad; ventral pouch absent. Acetabulum terminal, tilts ventrad, small to very large, sunken, margin not raised, aperture small to large. *Genital sucker absent*, pore ventro-median, pretesticular. Excretory vesicle at least partly in acetabular zone. *Oral sucker without evagination*; esophagus with or without muscular thickening; ceca long, nearly straight to wavy, end postequatorial, posttesticular, usually in acetabular zone.

Male organs: Testes 2, usually intercecal, small to large, finely lobulate to coarsely lobate, exceptionally nearly smooth, fields coincide to separate, zones coincide to separate; *cirrus pouch absent*.

Female organs: Ovary and shell gland usually posttesticular, never pretesticular; Laurer's canal may cross vesicle; uterus runs dorsally of testes, under arch of vasa efferentia, then ventrally of vas deferens.

Eggs: With (or without ? ?) operculum.

TYPE SPECIES.—*P. cervi* (Schrank, 1790).

- D².** Excretory pore in vesicular zone; ventral chamber of genital atrium small, complicated; musculoæ quite large, coiled; ceca wavy; testicular zone slightly preacetabular, testes slightly larger than acetabulum, testicular fields nearly coincide; ovary acetabular; vesicle not club-shaped; body between 4.5 and 7 mm. long, 2.46 mm. broad, 2.26 mm. thick; type host *Cervus eldi*.....*P. shipleyi*, p. 150.
- D³.** Excretory pore postvesicular; ventral chamber of genital atrium absent; ceca sinuous; testicular zones about to separate, slightly preacetabular; testicular fields coincide; vitelline follicles coarse, grouped, extend esophageal, cecal, postcecal; vesicle not club-shaped; body 2 to 6 mm. long, 0.7 to 2.5 mm. broad; type host *Bos bubalus*, Cochin China, and *B. taurus*, Annam.....*P. scolioceelum* Fischæder, 1904.
- A².** Laurer's canal crosses excretory canal or vesicle; Laurer's pore (except in *cauliorchis* and possibly *papilligerum*) caudad of excretory pore; ovary never entirely cephalic of vesicle, but always ventral; testes not distinctly larger, but usually smaller than or about equal to acetabulum; esophagus without muscular thickening; ceca sinuous to wavy, not straight:
- B³.** Ventral chamber of genital atrium very large; testes lobate, about equal in size to acetabulum, testicular fields median, nearly coincide, zones slightly separate, nearly about, preacetabular; acetabulum moderate; ceca long, end in acetabular zone, moderately broad; type *bothriophoron*.
- Subgenus *Bothriophoron*, p. 77.
- C⁴.** Ventral chamber not papillate; pore of Laurer's canal latero-caudad of excretory pore, which is prevesicular; testes a little removed from acetabulum; genital sphincter present; body 6 to 9 mm. long; type host *Bos indicus*, Madagascar.....*P. bothriophoron*, p. 77.
- C⁵.** Ventral chamber papillate; pore of Laurer's canal slightly caudad of excretory pore; testes slightly preacetabular; body 8.5 mm. long, 4.3 mm. broad; type host *Cervus eldi*.....*P. papilligerum*, p. 78.
- B⁴.** Ventral chamber of genital atrium absent or small:
- C⁷.** Acetabulum large to very large:
- D⁴.** Excretory pore prevesicular:
- E¹.** Testicular fields separate, not median, zones overlap, testes lobate, much smaller than acetabulum, acetabular to somewhat preacetabular but not far removed; musculoæ long and thick; Laurer's pore postero-lateral of excretory pore; ventral chamber (?); genital pore postbifurcal, excretory vesicle not narrow, but swollen; acetabulum large; body 5 to 8 mm. long; type hosts *Bos taurus*, Togo, *Bos zebu*, German East Africa.....*P. calicophorum*, Fischæder, 1901.
- E².** Testicular fields median, coincide or overlap, zones lobate, testes much smaller than and near the acetabulum; ventral chamber absent; excretory vesicle long and narrow; acetabulum very large:
- F¹.** Genital pore in suctorial zone; musculoæ straight, narrow, prostatica shorter than musculoæ; acetabulum less than half as long as body; testes large; ceca wavy, broad; excretory vesicle long; body 9.75 mm. long, 4.5 mm. broad; type host *Buffelus indicus*.
- P. fraternum*, p. 131.
- F².** Genital pore in esophageal zone; musculoæ coiled; testes large; acetabulum more than half as long as body; ceca wavy, moderately broad, end in acetabular zone; body 6 to 9 mm. long, 4 mm. broad; type host *Bos indicus*, Siam.....*P. siamense*, p. 161.
- F³.** Genital pore in postbifurcal zone; musculoæ (?); prostatica longer than musculoæ; acetabulum less than half as long as body; ceca sinuous, moderately broad, end in acetabular zone; body 8 to 13 mm. long; type host *Bos indicus* at Berlin, Germany.
- P. explanctum* Creplin, 1847.

- D*⁵. Excretory pore in vesicular zone; testes small, much smaller than acetabulum, cauliflower shaped, near acetabulum; vesicle bag-like; ceca wavy:
- E*³. Testicular fields separate, not median, testes pre- and acetabular; musciosa enormous; vasa efferentia convex cephalad; ovary ventro-cephalic of vesicle; pore of Laurer's canal slightly latero-cephalic of excretory pore; genital pore postbifurcal; ceca moderately broad; body 6 to 7.5 mm. long, 3.6 to 4.25 mm. broad; type host *Bos indicus*, India.....*P. cauliorchis*, p. 86.
- E*⁴. Testicular fields overlap, median; testes diagonal, pre- and acetabular, musciosa large; ovary ventral of vesicle; pore of Laurer's canal caudad of excretory pore; genital pore in suctorial zone; ceca broad; body 6 to 6.5 mm. long, 4 to 4.76 mm. broad; type host *Bos indicus*, India.....*P. crassum*, p. 101.
- E*⁵. Testicular fields coincide, median, testes preacetabular; musciosa large; ovary ventro-cephalic of vesicle; pore of Laurer's canal caudad of excretory pore; ventral chamber small, papillate; genital pore in esophageal zone, ceca moderately broad; body 5 to 6 mm. long, 2.6 mm. broad; type host *Bos indicus*, India.....*P. papillosum*, p. 112.
- C*³. Acetabulum small to moderate; ventral chamber absent; testicular fields median, coincide or overlap; ovary ventral of vesicle:
- D*⁶. Testes distinctly removed from acetabulum; genital pore postbifurcal; vesicula club-shaped; excretory pore prevesicular:
- E*⁶. Acetabulum small, about one-eighth as long as body; genital sphincter absent; pars prostatica large, oval; musciosa short, not coiled; body 11 to 15 mm. long; type host *Bos kerabau*, also in *Portax tragocamelus*.....*P. gracile* Fischæder, 1901.
- E*⁷. Acetabulum moderate; genital sphincter present; pars prostatica thin; musciosa long, coiled; body 8 to 11 mm. long; type host *Antilope dorcas*.....*P. microbothrium* Fischæder, 1901.
- D*⁷. Testes near acetabulum:
- E*⁸. Testes much smaller than acetabulum, cauliflower-like; excretory vesicle bag shaped, distended; excretory pore in pre- and vesicular zones; body 5.25 to 9.5 mm. long, 2 to 3 mm. broad; type host *Bos indicus*, India.....*P. indicum*, p. 121.
- E*⁹. Testes about equal to (or slightly smaller or larger than) acetabulum; excretory pore distinctly prevesicular; type *cervi*.
Subgenus *Paramphistomum*, p. 77.
- F*⁴. Testes nearly smooth; genital pore prebifurcal; pars musciosa very short; body 3 to 8 mm. long; type hosts *Cervus simplicicornis*, *C. campestris*, *C. mexicanus*, *C. rufus*, *C. dichotomus*, *C. namby*, Brazil.....*P. liorchis* Fischæder, 1901.
- F*⁵. Testes lobate:
- G*¹. Testes distinctly smaller than acetabulum; acetabulum one-third as long as body; body 11 to 15 mm. long; type host *Bos kerabau*, Ceylon.....*P. bathycotyle* Fischæder, 1901.
- G*². Testes not distinctly smaller than acetabulum:
- H*¹. Genital pore bifurcal or only slightly postbifurcal; body 5 to 12 mm. long; type host *Cervus elaphas*, Europe...*P. cervi* (Schränk, 1790).
- G*³. Genital pore markedly postbifurcal; body 5 to 9 mm. long, 2 to 3 mm. broad; type hosts *Bos bubalus*, Cochin-China, and *Bos indicus*, at Berlin, Germany.....*P. epichitum* Fischæder, 1904.

Subgenus **PARAMPHISTOMUM**.

SUBGENERIC DIAGNOSIS.—*Paramphistomum* (p. 73): Ceca sinuous to wavy, not straight; long, end in or close to acetabular zone; esophagus without muscular thickening. Acetabulum moderate, terminal. Excretory vesicle elongate, more or less club shaped, its pore prevesicular. Ventral chamber of genital atrium absent.

Male organs: Testes lobate to smooth, near and about equal to acetabulum, at least neither very much larger nor very much smaller (except possibly *bathycotyle*), testicular zones slightly separate or abut or slightly overlap, fields median, nearly or quite coincide.

Female organs: Ovary ventral of vesicle; Laurer's canal crosses excretory canal or vesicle, its pore caudad of excretory pore; vitellaria in esophageal, cecal, and post-cecal zones.

TYPE SPECIES.—*P. cervi* (Schränk, 1790).

This subgenus contains at least 4 species (*cervi*, *epiclitum*, *liorchis*, and *bathycotyle*), all of which have been studied by Fischæder.

ORTHOCELIUM, new subgenus.

SUBGENERIC DIAGNOSIS.—*Paramphistomum* (p. 73): Ceca nearly or quite straight, end preacetabular or in proximal portion of acetabular zone; esophagus with slight muscular thickening. Acetabulum small, terminal, tilts ventrad. Excretory vesicle club shaped. Ventral chamber of genital atrium absent.

Male organs: Testes about equal to or larger than acetabulum, lobate, zones abut and are considerably preacetabular, fields coincide, in median line.

Female organs: Ovary prevesicular; Laurer's canal does not cross excretory vesicle or duct, its pore cephalad of excretory pore; vitelline follicles coarse, grouped, extend from esophageal into postcecal and even into acetabular zone.

TYPE SPECIES.—*Paramphistomum orthocælium* Fischæder, 1901.

This subgenus, which at present contains two species (*orthocælium* and *dicranocælium*, see key p. 74), will probably eventually be recognized as a distinct genus. Both of these species have been studied by Fischæder.

BOTHRIPHORON, new subgenus.

SUBGENERIC DIAGNOSIS.—*Paramphistomum* (p. 73): Ceca sinuous to wavy, not straight; long, end in acetabular zone, and moderately broad; esophagus without muscular thickening. Acetabulum moderate, terminal. Excretory vesicle distended, not club shaped. Ventral chamber of genital atrium very large.

Male organs: Testes lobate, about equal in size to and not far away from acetabulum, testicular zones slightly separate, nearly abut, fields median, nearly coincide.

Female organs: Ovary ventral of vesicle; Laurer's canal crosses excretory canal or vesicle, its pore (in the type species at least) caudad of the excretory pore; vitellaria well developed, extend from bifurcation to slightly caudad of ceca.

TYPE SPECIES.—*Paramphistomum bothriophoron* (Braun, 1891).

Two species (namely, *bothriophoron* and *papilligerum*) may be classified here. They are easily separated by the papillate or non-papillate condition of the ventral chamber of the genital atrium. *P. bothriophoron* has been recently studied by Fischæder.

PARAMPHISTOMUM PAPILLIGERUM, new species.

[Figs. 53 to 56.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body 8.5 mm. long by 4.3 mm. broad; color (?); greatest breadth near caudal end; tapers gradually to bluntly pointed oral pole, very rapidly to very bluntly rounded caudal pole. Surface without papillæ. Genital pore at junction of cephalic with equatorial thirds of body, with elliptical bulging 1.08 mm. in transverse, 0.8 mm. in longitudinal diameter, with 2 transverse labia; genital pore about 0.61 mm. by 0.37 mm.; surface of bulging sparsely papillate; at this point a crateriform, papillate atrium. Acetabulum terminal, sunken in parenchyma, its margin not projecting, 1.88 mm. in transverse diameter, opening caudad (terminal) 0.46 mm. in transverse diameter. Mouth in depression at cephalic pole; oral sucker rather oval in frontal section, its lumen papillate; lies in a well developed perisuctorial cavity; esophagus bent, convexity ventrad, its wall rather uniform in thickness; ceca long, wavy dorso-ventrally, extend caudad about to equator of acetabulum. Excretory pore about dorso-median, slightly cephalad of pore of Laurer's canal; excretory canal runs to dorsal (or dorso-caudal?) aspect of well-developed vesicle lying dorsally and dorso-cephalad (?) of acetabulum.

Male organs: Testes large, lobate, in median line, intercecal, fields overlap, zones slightly overlap; union of vasa efferentia slightly cephalad of cephalic testis; vas deferens dilated, coiled; pars intermedia connects this with coiled musculosa; pars prostatica relatively short, passes directly ventrad; ductus ejaculatorius opens just above metraterm into transverse (in frontal plane) slit-like chamber, whence a duct passes ventrad apparently piercing a papilla; the latter projects into a chamber which is connected by a very short duct with the papillated genital atrium.

Female organs: Ovary and shell gland between caudal testis and acetabulum, ovary slightly to left of median line, shell gland about median; vitellaria with well-developed, sparsely scattered follicles, chiefly in extracecal area, extending from esophageal to slightly caudad of cecal zone; uterus extends from shell gland slightly caudo-sinistrad, then ventrally of ovary and shell gland dextrad, bends cephalad dorsally of testes, ventrad under arch of vasa efferentia, cephalad ventrally of vas deferens to open caudad of male opening into the slit-like chamber.

Eggs: Oval, 135μ by 67μ , operculated (?).

TYPE.—U.S.P.H. & M.H.S. 10706 (returned to Doctor Shipley).

HABITAT.—In (stomach (?)) of *Cervus eldi*, locality not known.

SOURCE OF MATERIAL.—The material, consisting of a series of frontal sections, was kindly loaned us by Dr. A. E. Shipley.

EXTERNAL CHARACTERS.

SIZE.—Measurements taken from the sections give about 8.5 mm. for the maximum vertical diameter and about 4.3 mm. for the maximum transverse diameter.

FORM.—The greatest width of the worm is near the caudal extremity, from which region it tapers in both directions. The caudal extremity is broad, rounded from side to side, and presents the aperture of the acetabulum; the cephalic extremity is bluntly pointed and presents at its vertex a well-marked depression, at the bottom of which is the oral aperture.

SURFACE.—The general surface of the worm appears unprovided with such structures as spines or hooks, and except for the genital bulging is without papillæ.

Genital pore.—In about the median sagittal line of the venter and about at the junction of the cephalic with the middle third of the body length there is a bulging, elliptical in outline and measuring at the base about 1.08 mm. in transverse and about 0.80 mm. in vertical diameter. At the vertex of this bulging there are two transverse lip-like structures, continuous laterally, which bound, as it were, a transversely elliptical aperture. This aperture may be regarded as the genital pore, and measures 0.61 mm. in transverse and about 0.37 mm. in median sagittal diameter. The surface of the bulging is beset by minute sparsely scattered papillæ.

The genital pore gives entrance to a crateriform depression or atrium, the surface of which is closely beset by nipple-like papillæ (fig. 53), which are considerably larger than those of the surface of the genital bulging.

Acetabulum.—The acetabulum is in the caudal extremity of the worm and measures 1.88 mm. in greatest transverse diameter. Its aperture is terminal and measures 0.46 mm. in maximum transverse diameter. The rim of the acetabulum does not project beyond the caudal body surface, but appears rather retracted and its aperture slightly encroached upon by folds of the encircling portions of the body.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The mouth is at the bottom of the depression at the cephalic pole of the worm, and leads directly into the lumen of a large muscular oral sucker.

In frontal section the sucker has an oval form with a broad rounded base, which gives origin to the esophagus. The oral pole of the sucker projects in a ring-like manner beyond the adjacent surface. A roomy perisuctorial space is present. The lumen of the sucker is closely beset by well-marked conical papillæ. The esophagus at first passes directly caudad in about the median sagittal plane, then bends ventrad and describes a short curve, or possibly forms only a moderate bend (the interpretation is difficult) with its convexity ventrad. It then passes caudo-dorsad and forks into the lateral intestinal ceca at or somewhat cephalad of the level of the genital pore. This relation could not be made out with precision from the sections. The thickness of the esophageal wall is substantially uniform throughout. Its lumen is lined with a cuticle-like layer. In about the equator of the esophagus and dorsally of it there is a transverse ganglionic cord. The intestinal ceca pass at first laterad and slightly cephalad at or slightly less than a right angle with the esophagus, then turn caudad pursuing a dorso-ventrally wavy course approximately parallel to the lateral body wall, terminating by blind extremities about 5 mm. caudad of the esophageal arch close to the corresponding dorso-lateral aspect of the acetabulum.

GENITAL SYSTEM.—The sexual organs, with the exception of the vitellogene glands, are disposed in the intercecal area.

Male organs.—There are two lobate testes, one caudad of the other, their opposing aspects being in close apposition. The cephalically placed of the two is a little nearer the left and the caudally placed a little nearer the right lateral body margin. In some of the sections the testes appear somewhat wedge-shaped, the left edge of the cephalic testis and the right of the caudal testis being (vertically) the longer of the vertical edges of the 2 testes. As the testes are in fairly close apposition, the line of separation between them runs somewhat obliquely from the right to the left and caudad, and consequently their zones overlap to a slight extent (fig. 54). A vas efferens springs from each testis; that from the caudal gland passes cephalad with a

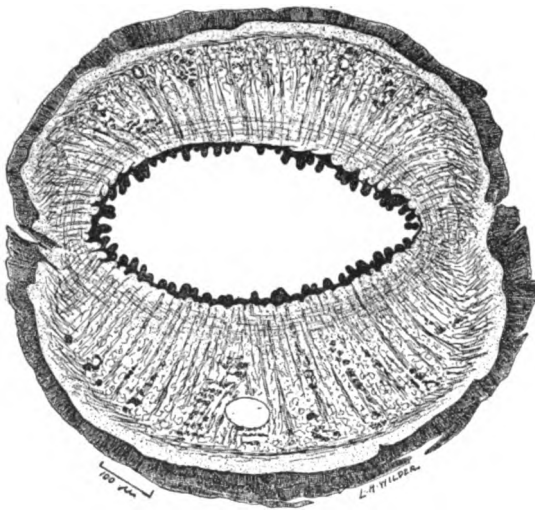


FIG. 53.

slight tilt dorsad between the cephalic testis and the right gut, and is of considerable transverse diameter; that from the cephalic testis passes at first dorsad, then to the left and cephalad. The latter is of a smaller caliber and soon reaches the upper part of the space between the dorso-lateral aspect of the gland from which it springs and the left gut, and then dilating

rather abruptly it curves cephalo-mediad to unite with its fellow of the right side, which likewise curves cephalo-mediad to meet it, and the two thus form the vas deferens. The vasa efferentia in uniting form a transverse arch at a level apparently slightly cephalad of that of the superior margin of the cephalic testis; beneath this arch the uterus is seen to pass as it arches cephalo-ventrad over the cephalic testis. The vas deferens presents at first a much dilated, thin-walled, coiled vesicula measuring about 0.27 mm. in diameter; this is succeeded by a long, thick-walled, coiled pars musculosa of about 180μ in diameter and with a thickness of wall of about 60μ . Between the vesicula and the musculosa there is intercalated a relatively thick-walled segment measuring about 75μ in diameter. The musculosa is succeeded by a relatively short prostatica; this part of the vas deferens is inclosed in a thick layer (75μ) of prostatic cells and passes directly ventrad. The prostatic

a very short and quite narrow duct. This series of atria and connecting ducts of the hermaphroditic copulatory apparatus seems to resemble that of *Paramphist. shipleyi*. The marked and striking difference between the two, so far as one can judge from the sections avail-

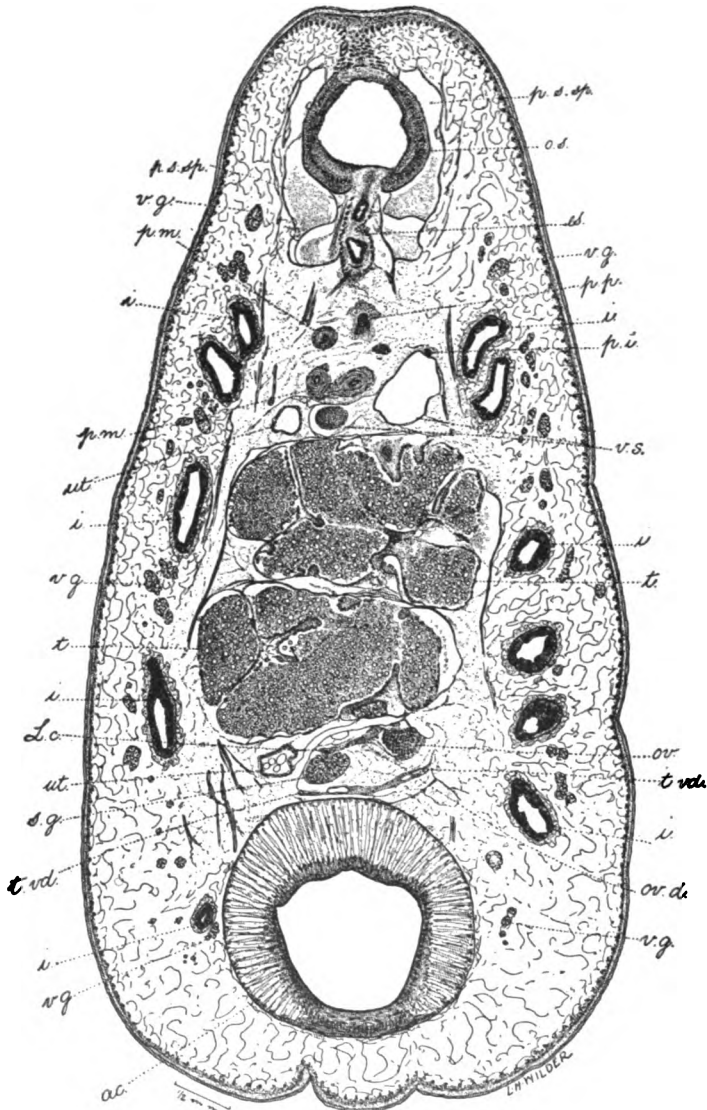


FIG. 55.

able for study, consists in the difference (1) in the size and form of the genital pore (that of *P. papilligerum* is large, elliptical, and measures 610μ in transverse diameter, while that of *P. shipleyi* is 1, approximately circular, and measures about 75μ in transverse

diameter); and (2) in the size and form of the ventral chamber of the genital atrium), which in *P. papilligerum* is large crateriform,

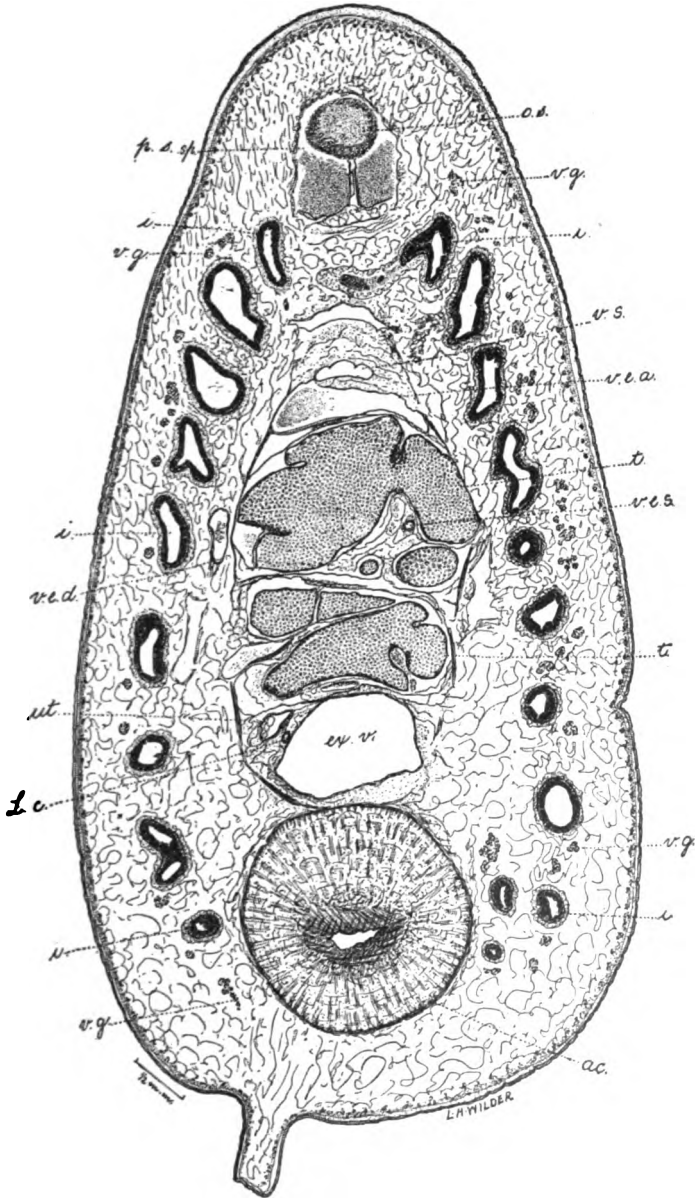


FIG. 56.

with its surface beset by well developed nipple-like papillæ, while in *P. shipleyi* the ventral chamber is small, slit-like, and without papillæ on its surface.

Female organs.—The ovary and shell gland are in the caudal portion of the worm, between the caudal testis and the acetabulum, and nearer the venter than the dorsum. The ovary is the larger of the two female glands and is also the nearer to the venter and is placed a little to the left of the median sagittal plane. The oviduct springs from the dorsal pole of the ovary; it passes to the right, curving gently caudad as it proceeds toward the shell gland, close to the cephalic aspect of which it forks. One limb of the fork, which may be regarded as the continuation of the oviduct, turns sharply caudad to penetrate the shell gland; the other limb bends dorso-caudad and, as Laurer's canal, at first skirts the right side of the dome of the excretory vesicle, but as it tends more and more caudad it crosses the right side of the vesicle and eventually reaches the dorsum a little to the right of the median sagittal plane and about, or perhaps a little less than 0.52 mm. caudad of the excretory pore. The shell gland is close to the right caudo-lateral aspect of the ovary, close to the ventro-cephalic aspect of the excretory vesicle, and in about the median sagittal plane of the worm.

As already described, it is penetrated on its cephalic aspect by the oviduct which unites in the substance of the gland with the common vitello-duct. The latter duct penetrates the gland at its caudal aspect. The union of these ducts results in the formation of the ootype, which is directed ventrad in the substance of the gland. The ootype is continued as the uterus, which emerges from the ventral pole of the gland. After emerging, the uterus dips caudad and to the left, then doubling back it forms coils ventrally of the ovary and shell gland, then winds its way dorsad to the right of the shell gland beneath the caudal testis, close to and on the right of Laurer's canal. On reaching the space between the caudal testis and the dorsum it begins to wind its way cephalad. Eventually it reaches the level of the superior margin of the cephalic testis, where it bends ventrad, passing, as already mentioned, beneath the arch of union of the vasa efferentia to gain the ventro-lateral aspect of the coiled vas deferens. Here it bends cephalad, ascending in close relation to the vas deferens, ultimately arching ventrad close to the caudal aspect of the pars prostatica and ductus ejaculatorius to open, as has been described, just beneath the latter into a small slit-like chamber. The uterus is distended more or less in various portions of its course by eggs and by masses of spermatozoa. The eggs are oval in form; some of them measured 135μ in length by 67μ in width.

The vitellaria consist of sparsely scattered well developed follicles in the extracecal areas. Vertically they extend from about the level of the base of the oral sucker to or perhaps slightly caudad of the level of the cecal ends of the gut. Their zone, therefore, is about coextensive with the combined zones of the esophagus and intestinal

ceca. A transverse vitello-duct from each gland passes mediad ventrally of the corresponding intestine. These ducts unite close to the ventro-caudal aspect of the shell gland. The common vitello-duct thus formed passes dorsad close to the shell gland, the caudal aspect of which it eventually penetrates.

EXCRETORY SYSTEM.—This seems well developed. A large vesicle lying dorsad of the acetabulum is present. An excretory duct leaves the dorsal, probably caudo-dorsal, aspect of the vesicle and passes to about the median vertical line of the dorsum to open at a point in a transverse plane slightly cephalad of that of the pore of Laurer's canal.

RELATION TO OTHER SPECIES.

This species appears most nearly related to *Param. bothriophoron*, from which it differs mainly in the structure of the copulatory apparatus. In *P. papilligerum* the genital chamber is papillated and the genital pore is without a sphincter; in *P. bothriophoron* the chamber is not papillated and the genital pore is encircled by a sphincter. Besides this, large papillæ line the suctorial lumen of *P. papilligerum*; they are absent in *P. bothriophoron*.

ILLUSTRATIONS.

FIG. 53.—Optical section through genital bulging near its vertex. Shows papillæ in genital atrium. Enlarged. Original.

FIG. 54.—Optical section. Shows depression at oral pole leading to the mouth; oral sucker (*o. s.*) with papillæ, perisuctorial space (*p. s. sp.*), pars prostatica (*p. p.*), pars musculosa (*p. m.*), vesicula seminalis (*v. s.*), uterus (*ut.*), lobate testes (*t.*), ovary (*ov.*), shell gland (*s. g.*), intestine (*i.*) of left side, vitellaria (*v. g.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 55.—Optical section. Shows oral sucker and papillæ (*o. s.*), perisuctorial space (*p. s. sp.*), esophagus (*es.*), point of change from musculosa to prostatica (*p. p.*), pars musculosa (*p. m.*), pars intermedia (*p. i.*), vesicula seminalis (*v. s.*), uterus (*ut.*), testes (*t.*), ovary (*ov.*), oviduct (*ov. d.*), shell gland (*s. g.*), Laurer's canal (*L. c.*), transverse vitello-ducts (*t. vd.*), intestinal ceca (*i.*), vitellaria (*v. g.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 56.—Optical section. Shows portion of oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*) with granular coagulum, intestinal ceca (*i.*), vesicula seminalis (*v. s.*), arch of union of vasa efferentia (*v. e. a.*), right vas efferens (*v. e. d.*), left vas efferens (*v. e. s.*) passing dorsad from its point of origin on one of the testicular indentations, testes (*t.*), excretory vesicle (*ex. v.*), Laurer's canal (*L. c.*), uterus (*ut.*), acetabulum (*ac.*), and vitellaria (*v. g.*). Enlarged. Original.

CAULIORCHIS,^a new subgenus.

SUBGENERIC DIAGNOSIS.—*Paramphistomum* (p. 73): Ceca distinctly wavy, end in acetabular zone; esophagus without muscular thickening. Acetabulum very large, terminal, tilts ventrad, aperture likely to be rather small. Excretory vesicle not elongate-club shaped, but distended and bag-shaped, its canal rather short, directed dorsad and may extend slightly cephalad or caudad, its pore in vesicular zone. Ventral chamber (?) of genital atrium.

Male organs: Testes very much smaller than acetabulum, cauliflower-like, in pre- or acetabular zones, testicular zones separate, or overlap or coincide, fields separate or overlap or coincide; musculosa well developed, may be enormous, coiled.

Female organs: Ovary ventral to ventro-cephalic of vesicle; Laurer's canal crosses excretory vesicle or canal, its pore is in vesicular zone, caudad to caudo-laterad of excretory pore, the two pores may be quite close to each other.

TYPE SPECIES.—*P. cauliorchis* n. sp.

At least 2 species (*cauliorchis* and *crassum*), probably a third species (*papillosum*), and possibly, but doubtfully, two other species (*indicum* and *calicophorum*) may be placed in this subgenus.

PARAMPHISTOMUM CAULIORCHIS new species.

[Figs. 57 to 70.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body 6 to 7.5 mm. long by 3.66 to 4.25 mm. in maximum breadth; grayish buff in color (alcohol specimens); viewed ventrally, pear shaped; viewed laterally, reminds one of an infant's shoe (the caudal end representing the top, the dorsal angle representing the heel, and the oral pole representing the toe); greatest diameter about at junction of equatorial and caudal thirds; tapers rapidly, then gradually to bluntly pointed, rather truncated conical oral pole; caudal end bluntly rounded when viewed ventrally, truncated when viewed laterally; sagittal line of dorsum markedly convex, almost circular at broadest diameter; transverse section nearly circular. Surface with transverse grooves, especially ventrally; oral pole with small conical papillae; surface folds around aperture of acetabulum. Genital pore ventro-median, about one-fourth of body length from oral pole and at or somewhat caudad of oral sucker and intestinal bifurcation; the pore is situated on large, 0.7 mm., hemispherical, erectile, retractile, bulging structure, the latter encircled by a ridge; it leads into an atrium into which from its dorsal wall, extends an elongate genital papilla, bearing at its vertex the porus hermaphroditicus; the genital papilla is closely encircled by a broad band-like muscular wall of the atrium; atrium divided into a larger dorsal and a smaller ventral portion by a deep circular groove; when the erectile bulging structure is retracted the encircling ridge forms a pair of transverse labia, between which is a transverse slit. Acetabulum anatomically terminal, but because of bending of body of worm it comes to lie ventro-subterminal; sunken into body of worm; very large, 2.5 mm. in dorso-ventral, 3 mm. in transverse diameter, aperture about 0.95 mm., directed ventro-caudad; cavity very deep. Mouth terminal, buccal cavity crateriform, papillated; oral sucker large, 1 to 1.1 mm. long or one-fifth to one-sixth of body length, 0.74 mm. thick, 0.98 mm. broad, pyriform, its papillated lumen broad and flat; sucker lies in a perisuctorial cavity and is bound to parenchyma dorsally and ventrally by mesenterium-like bands; esophagus tortuous, about as long as (at least not shorter than) oral sucker; bifurcation usually cephalad of genital pore; ceca long,

^a From *caulis* (from *καυλός*), a cabbage stalk, a cabbage [*Brassica oleracea* is the cauliflower], and *ὄρχις*, testicle.

extending in wavy course to near caudal margin of acetabulum. Excretory pore dorso-median at or near plane of caudal margin of aperture of acetabulum, 60 to 320 μ caudad of Laurer's canal; excretory canal thick walled, arises about on border between third and fourth quarter of length of vesicle; excretory vesicle dorsal of acetabulum, of moderate dimensions.

Male organs: Testes immediately caudad of equator, in same transverse plane, though one may extend very slightly farther cephalad, and farther dorsad also, than the other; irregular in outline, cauliflower-like in section; vas efferens arises from lateral aspect, passes in an arch medio-cephalo-dorsad, then caudad, then medio-dorso-caudad about to plane of origin, then mediad to unite with its fellow to form vas deferens; vas deferens very highly developed, occupying most of intercecal area cephalad of testes; vesicula seminalis intricately coiled; pars muscosa enormously developed, attains 0.4 mm. in thickness; pars prostatica nearly straight, attains 1.2 mm. in length, runs cephalo-ventrad or almost directly ventrad; ductus ejaculatorius rather short, straight, opens into dorsal dilatation of ductus hermaphroditicus cephalad of metaterm. Ductus hermaphroditicus with dorsal dilatation and runs through genital papilla.

Female organs: Ovary considerably smaller than testes, right or left of median line but caudo-mediad of one testis; shell gland smaller than ovary, median and caudad or cephalad of ovary; vitellaria with sparsely scattered small follicles, lateral, extends from about equator of oral sucker about to end of ceca; uterus runs in loops ventrally from shell gland, then turns dorsad, extends cephalad in dorsal portion of median field, bends ventrad under arch of vas deferens, cephalad ventrally of pars muscosa to open into dilated portion of ductus hermaphroditicus; Laurer's canal runs from oviduct, crosses on right or left of excretory vesicle, and opens slightly to right or left of median line, 60 to 320 μ cephalad of excretory pore.

Eggs: Not observed.

TYPE: U.S.N.M. 7155. Cotype U.S.B.A.I. 15026.

HABITAT.—In (organ? of) *Bos indicus*, Sanawaar, Punjab, India.

SOURCE OF MATERIAL.—Four specimens were found in a bottle bearing the U.S.N.M. number 5775 and three in a bottle bearing B.A.I. number 1723. These were renumbered U.S.N.M. 7155 and 15026, respectively. Aside from the difference in the numbers the labels in the two bottles bear the following legend:

"Name *Amphistoma crumeniferum*. Locality, Sanawaar, Punjab, India. Host, *Bos indicus*. Collected by Dr. Giles. Date, III, 1893. Determined by Dr. Giles. Date, 1893. Presented by Dr. Giles. Date, 1893."

EXTERNAL CHARACTERS.

SIZE.—The 7 specimens forming the collection vary from 6 to 7.5 mm. in length. The greatest width varies from 3.66 to 4.25 mm. in 3 of the 7 specimens in which this diameter was measured.

COLOR.—The worms were of a grayish buff tint.

FORM.—The form is typically shown in figs. 57–60. In transverse section the body of the worm is approximately circular and its greatest transverse and dorso-ventral diameters are at about the junction of the equatorial with the caudal third of the body. From this region of the body these diameters become gradually reduced in the direction of both poles; toward the oral pole the reduction is rapid for a short

distance, then it becomes very slow, the total reduction being considerable; while toward the aboral pole it progresses uniformly, but the total is slight. In consequence of this the worm is bluntly pointed and the cephalic portion of the body appears somewhat cylindric and distinctly attenuated as contrasted with the massive ventrally bent caudal portion.

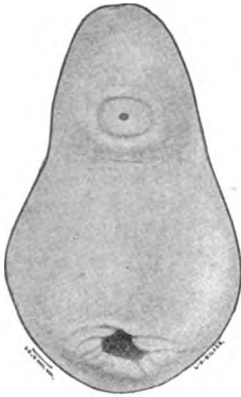


FIG. 57.

SURFACE.—The surface cuticle is unarmed; that is, it is devoid of scales or spines, but at the oral pole close to the aperture of the mouth the surface is provided with small rounded and conical papillæ. It is also marked by transverse grooves, which are best defined on the venter. At the caudal extremity around the aperture of the acetabulum the worm is deeply wrinkled, forming rounded folds and tabs which encroach upon and apparently reduce the size of the acetabular aperture (figs. 57, 60).

Genital pore.—In the median line of the ventral surface at about the junction of the first with the second fourth of the body is the genital pore (figs. 57–59, 61–63, 67). This pore, which measured 0.08 mm. in diameter in one specimen, is at the vertex of a hemispherical bulging which measured about 0.7 mm. in diameter. Encircling the base of this bulging structure is a ridge in the form of a transverse ellipse. The genital pore leads into a cylindrical dorso-ventrally running atrium, from the dorsal wall of which arises a somewhat elongate trumpet-shaped genital papilla. This papilla projects ventrad into the atrium for about two-thirds the length of the latter and is closely embraced by the encircling muscular ring-like atrium wall (figs. 62, 67). The atrium wall is divided into two unequal rings by a deep narrow circular groove; the larger or dorsal of the rings forms about two-thirds of the atrium wall and is the portion which has just been described as closely embracing the genital papilla. In section it is seen that these rings differ markedly in structure, the larger or dorsal ring being of a dense muscular structure, whereas the structure of the smaller ring is loose and but slightly muscular.

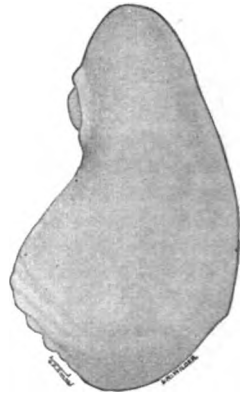


FIG. 58

The hemispherical bulging which bears the genital pore at its vertex, is of an erectile nature, and the worm has the power of causing its retraction. In the retracted state the ridge which has been described as forming an encircling ellipse about the base of the hemispherical bulging, forms two transverse lips continuous laterally (figs. 59, 63).

Between these lips is a transverse more or less slit-like aperture which gives entrance to an irregular dorso-caudally directed passage which leads directly to the hermaphroditic pore.

Acetabulum.—The acetabulum is in the caudal terminal portion of the worm, but on account of the more or less decided bending ventrad of this portion of the body the acetabular aperture is tilted in the same direction. In one of the sectioned specimens this muscular organ, with an aperture measuring about 0.95 mm. in diameter, measured 2.5 mm. in dorso-ventral, 3 mm. in transverse diameter.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The bluntly pointed cephalic extremity presents a circular crateriform depression which is beset by conical papillæ; it leads into the oral sucker through a small circular opening which may be designated its oral aperture. The

sucker is large and muscular, varying in length between 1.08 and 1.18 mm., or from one-fifth to one-sixth the body length as measured in sections of 5 specimens. In one of these (figs. 61, 62) the extreme dorso-ventral and transverse diameters were 0.74 mm. and 0.98 mm., respectively; its form in median sagittal plane is shown in figure 62. It will be noticed that it resembles the retracted pear-shaped sucker of *P. calicophorum*, as described and pictured by Fischæder (1893h, p. 542, fig. 30). The sucker as a whole may, for purpose of description, be regarded as consisting of a dorsal and a ventral muscle, continuous one with the other laterally. These two muscles are each thickest in the median sagittal plane; they grow less thick as they extend laterad, being thinnest laterally where they are continuous one with the other.

The opposing faces of these muscles are closely approximated, so that the lumen of the sucker is reduced to a dorso-ventrally very narrow slit-like space; the latter is lined with a cuticle-like layer in anatomical continuity with that of the surface

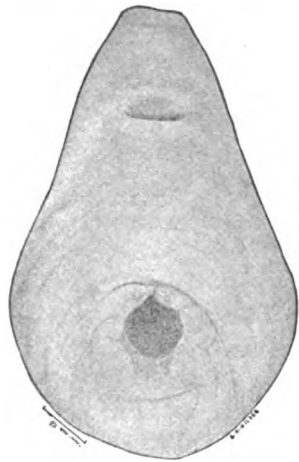


FIG. 59.

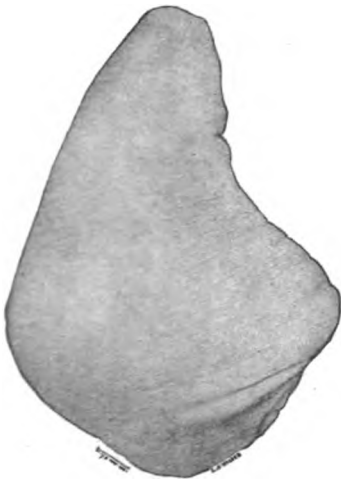


FIG. 60.

and is beset by very small closely aggregated papillæ. These papillæ are largest and most prominent in about the equatorial region of the sucker, becoming gradually smaller and less distinct as the oral and esophageal apertures are approached, close to both of which these papillæ do not appear to be present. Except at the oral and the esophageal ends the sucker is separated from the body parenchyma by a distinct circumsuctorial space, strongly suggestive of a body cavity, which is traversed here and there by mesenterium-like strands attaching the sucker, particularly the dorsal and ventral walls, to the inclosing parenchyma. The space contains, but does not appear to be at all filled with, a granular material and a few nuclei (?), the cell bodies of which are not clearly definable.

Dorsally of the circumsuctorial cavity and on a plane near the caudal end of the sucker is found the brain.

The esophagus takes origin at the base of the sucker. At a point about midway between its point of origin and the dorsal wall of the worm and at about the same or slightly lower (more caudad) level, namely, at from two-sevenths to one-fourth the body length from the oral margin, the esophagus divides into two intestinal ceca. The path pursued by the esophagus between its point of origin and its bifurcation was found to vary according to two general types; in one (figs. 61, 62, 64), to which 3 of the 5 sectioned specimens conformed, the esophagus almost immediately after leaving its point of origin tends ventrad and to either the left (2 specimens) or the right (1 specimen), curving around and skirting more or less closely the base of the sucker until it gains either the left or right dorso-lateral aspect of the latter, beyond which it proceeds in a more direct course to its point of bifurcation. In the second type (fig. 63), to which 2 of the 5 specimens conformed, the esophagus passes from its point of origin in a direction caudad and at the same time more or less ventrad for a variable distance. It then abruptly doubles back on itself, describing a U-shaped course in about the median sagittal plane of the body. The dorsal limb of the U quickly assumes a more or less direct course dorsad to the point of its bifurcation.

From their point of origin the intestinal ceca pass at first almost horizontally laterad, then curve gently latero-caudad and slightly ventrad to reach a point about 0.33 mm. from the body wall. Occasionally one or both ceca may arch slightly cephalad of their point of origin as they pass laterad. The ceca terminate at slightly different levels, but close to the dorso-lateral aspect of the acetabulum and a little above the plane of the caudal margin of the latter. In their path caudad the ceca describe a wavy course approximately parallel to the dorso-lateral aspect of the body wall (figs. 61, 62).

The lumen of the esophagus is lined with a continuation of the cuticle-like layer of the sucker. The intestines are lined with a

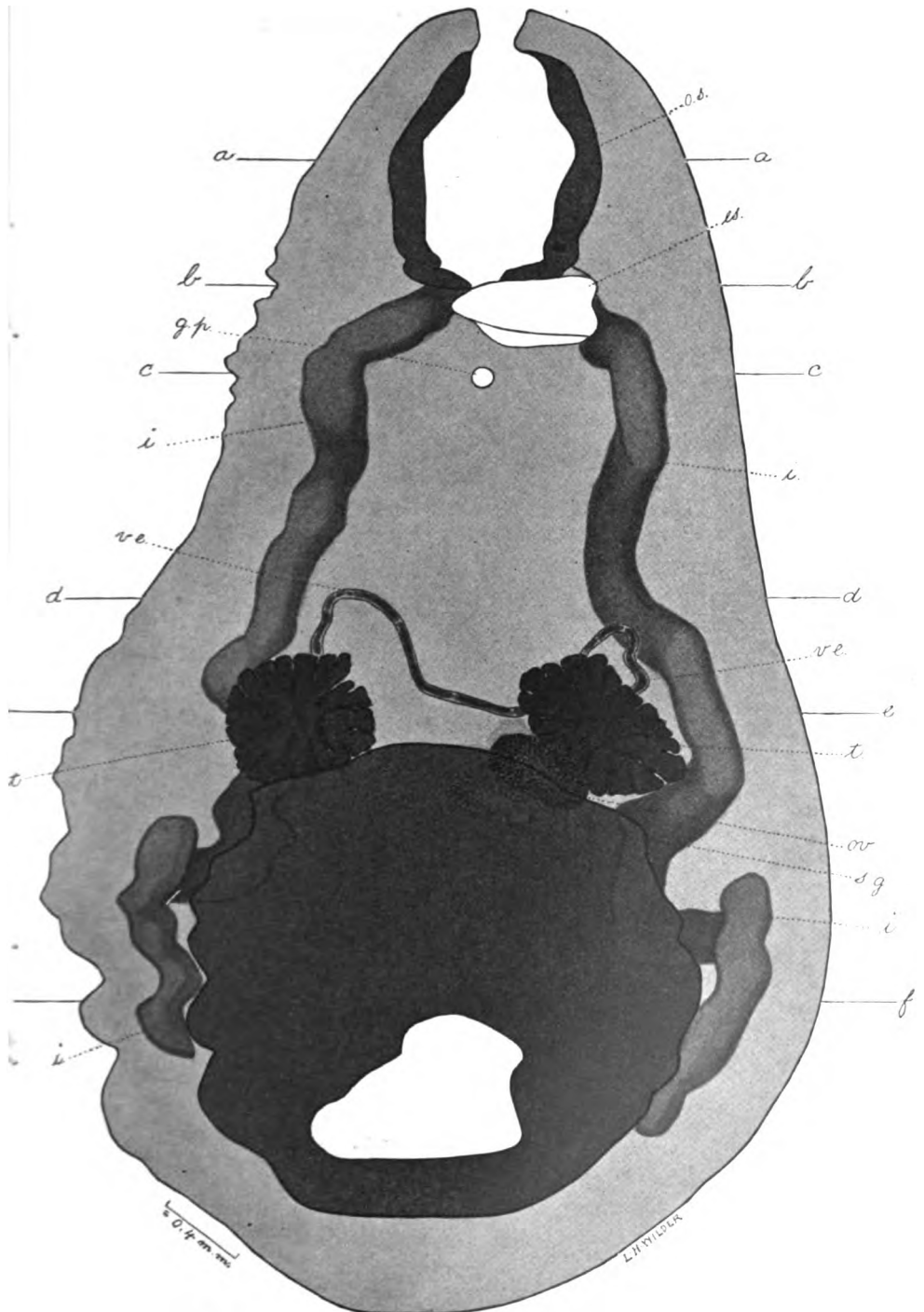


FIG. 61.

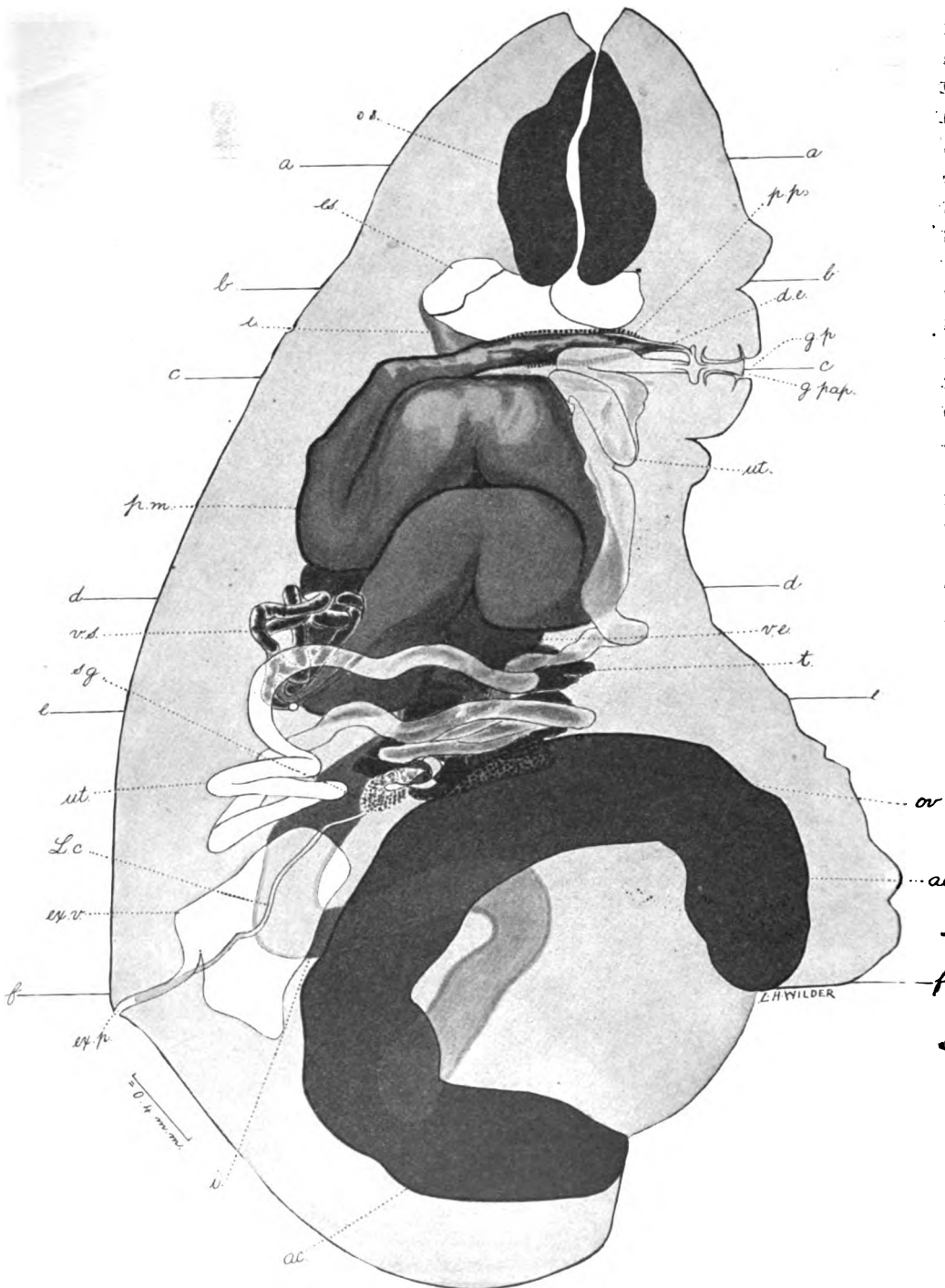


FIG. 62.

layer of epithelium, which begins abruptly at the bifurcation of the esophagus.

GENITAL ORGANS.—Excepting the vitellaria, both the male and the female genital organs are situated in the intercecal area.

Male organs.—The testes are in the zone immediately caudad of the equatorial plane, one on either side of the median sagittal plane. Further than this, however, the relation which they bear one to the other and to the acetabulum is subject to marked variation. Their superior (cephalic) margins may be in the same (3 specimens) or in different (2 specimens) transverse planes; in 2 specimens in which the latter condition obtained the superior margin of the left testis was 0.2 mm. cephalad of that of the right in one case, while in the other it was the superior margin of the right testis that was cephalad of that of the left, and in this instance the difference was

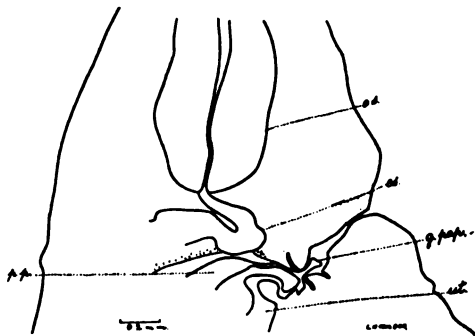


FIG. 63.

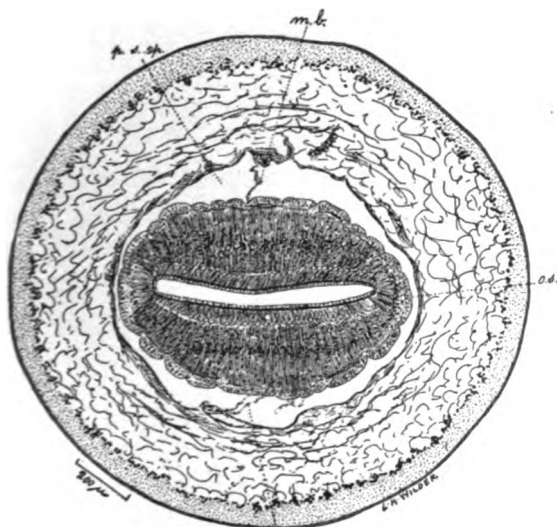


FIG. 64.

0.26 mm. Furthermore, in each of these 2 specimens the higher (cephalad) testis was also the farther dorsad. In 2 of the 3 specimens in which the superior margins of the testes were found in the same transverse plane the right testis was a little farther dorsad than the left; in the third of these specimens both testes were in about the same frontal plane. It may be observed in this

connection that a certain relation appears to exist between the position of the testes and that of the ovary and shell gland, namely, in 4 of the 5 specimens in which one of the testes was placed farther dorsad than the other the ovary and shell gland were found on that side of the median sagittal plane to which the dorsally placed testis belonged.

In 2 of the specimens the testes were immediately cephalad of the superior margin of the acetabulum; in 2 others they were immediately caudad of this level, and in a fifth they were at this level. They are greatly branched, cauliflower-like in sections, and differ slightly in size in the same and in different specimens. Measurements, from projections, of the left testis in one of these worms gave 1.2 mm. for the greatest dorso-ventral, 0.6 mm. for the greatest transverse, and 0.64 mm. for the greatest longitudinal diameter. A vas efferens arises from the external lateral aspect of each testis; these unite to form the vas deferens. The point of union of the vasa efferentia is generally at about the same level as the point of origin

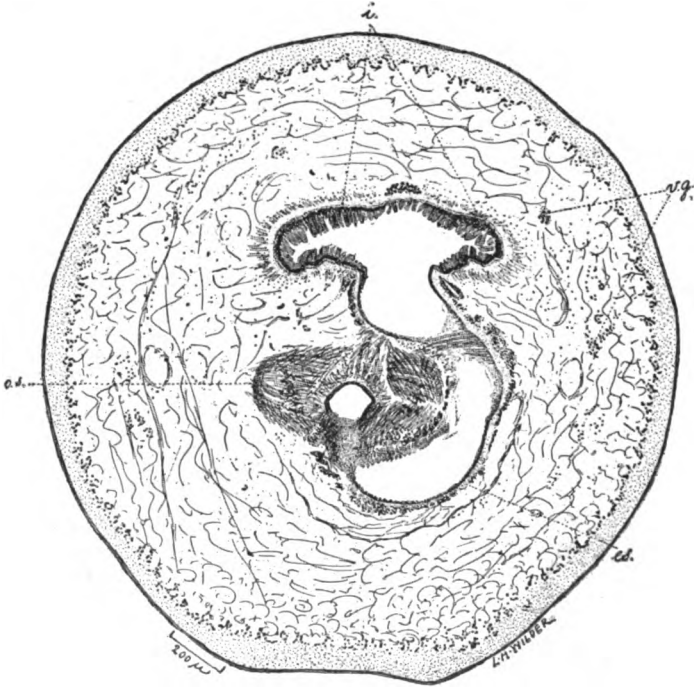


FIG. 65.

of one or both the vasa efferentia and more or less dorsad of the mid point in the ventro-dorsal diameter. The path pursued between their point of origin and their union is peculiar and differs from that in any of the other forms studied. Each vas at first passes medio-cephalo-dorsad for a variable distance, in some of the specimens considerably above the superior margin of the testis (figs. 61, 62) from which one or both originates. Each then turns caudad, describing a more or less well-marked curve, with its convexity cephalad, and then proceeds medio-dorso-caudad to about the level at which one or both originated, where they pass more or less directly inward to unite, as

has already been said, in the formation of the vas deferens. The vasa are fairly thick-walled ducts, measuring 60 to 75 μ in diameter in one of the specimens.

The vas deferens is very highly developed and occupies most of the space in the axial region of the body between the intestinal ceca cephalad of the testes. As in the other forms of this group, it is clearly differentiated into four portions. The first portion, or vesicula, is an intricately coiled, thin-walled, and but slightly dilated duct, which is succeeded by a strikingly large, thick, muscular-walled second portion, or pars musculosa, which measured 0.4 mm. in diameter, with a thickness of wall of 0.15 mm. in one specimen. The change from vesicula to musculosa is abrupt and is marked not only by the enormous increase in the diameter of the duct and in the thickness



FIG. 66.

of its wall, but by the interposition of a short section, which from its arrangement probably serves the purpose of a valve. This valvular segment—or pars intermedia (*p. i.*, fig. 68), as it may be designated—is a direct continuation of the vesicula, but the caliber of its lumen is greatly reduced, its walls are thick and muscular, but its total diameter is little, if at all, greater than that of the vesicula. Its distal end pierces the enormously thick muscular wall of the pars musculosa, into the lumen of which it projects in a manner resembling the projection of the cervical portion of the uterus into the human vagina. The musculosa is compactly coiled; the windings run in a vertical direction and, unlike those of the vesicula, can be traced without much difficulty. The musculosa is succeeded by the pars prostatica; the change from one to the other is marked by a structure suggesting

a valvular function (fig. 67). Except that there is not interposed an intermediate section between the musculosa and the prostatica, the valve-like arrangement appears to be exactly like that at the junction of vesicula and musculosa, with the further difference that the former is considerably smaller in diameter. As this point is approached, the musculosa becomes gradually reduced in diameter and its wall in thickness. The prostatica is not coiled; it pursues an almost straight or slightly sinuous course ventrad or cephalo-ventrad. In the latter case it describes a slight curve in a sagittal plane, with

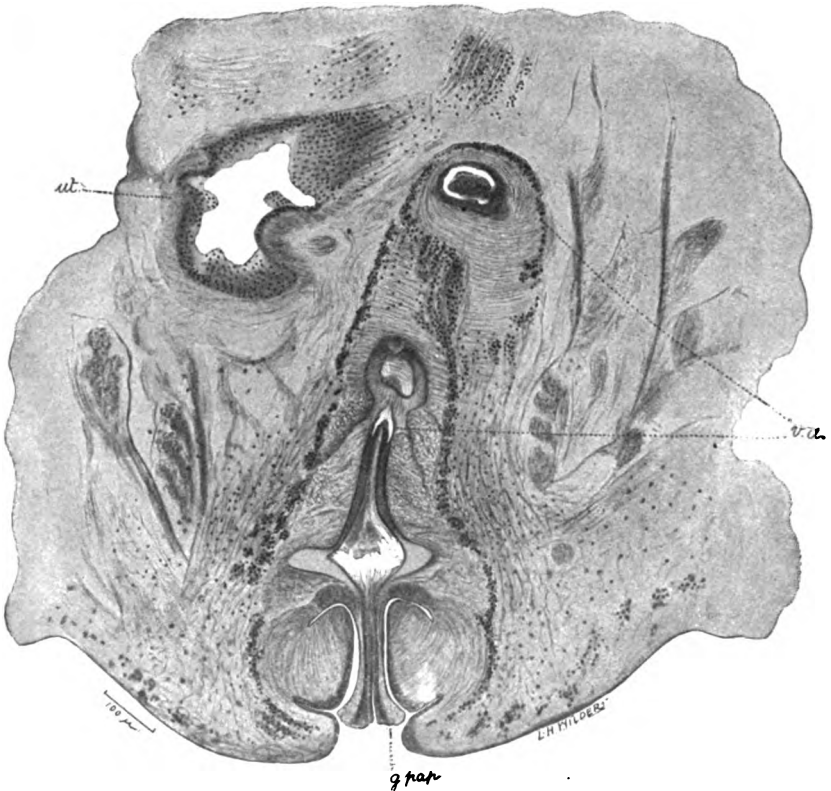


FIG. 67.

the convexity of the curve cephalad. Throughout its length it is inclosed in a mass of cells; in projection of one specimen the prostatica measured 1.2 mm. in length.

The diameter of this portion of the vas deferens becomes gradually reduced in its course ventrad. The reduction is for the most part at the expense of the lumen, for the walls remain highly muscular and but slightly reduced in thickness. The pars prostatica is succeeded by the fourth or terminal portion of the vas deferens. This portion, or ductus ejaculatorius, is a direct continuation of the prostatica, the

change from one to the other being defined only by the cessation of the cell mass characteristic of the prostatica. It passes directly ventrad and opens by a minute pore into the dorsal dilated vesicle-like portion of the ductus hermaphroditicus immediately above and quite separate from the aperture of the metraterm (fig. 62). It measures about 0.24 mm. in length in one specimen. The ductus hermaphroditicus is a delicate duct which pierces the axial region of the genital papilla to open externally as the porus hermaphroditicus. It leads from an atrium or vesicle which may perhaps be regarded as the dilated internal extremity of the duct. Into this vesicle or atrium there open the ductus ejaculatorius and the metraterm.

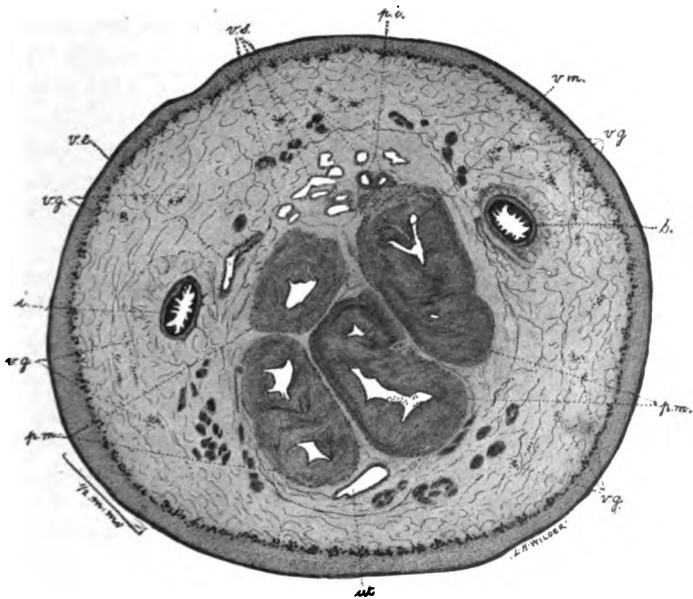


FIG. 68.

Female organs.—The ovary varies somewhat in size, form, and position, and in its relation to the shell gland. It is considerably smaller than either testis, close to one of which it is placed. In 3 of 5 specimens studied the ovary was on the right side of the median line close to the ventro-mesio-caudal aspect of the right testis; in the other 2 specimens it was on the left side, in one slightly caudad of the testis and in the other close to the ventro-mesio-caudal aspect of the left testis. The shell gland is smaller than the ovary but like the latter varies somewhat in size, form, and position; in 4 of 5 specimens it was close to the mesio-dorso-caudal aspect of the ovary; in the fifth specimen it lay close to the mesio-cephalic aspect of the ovary. The oviduct springs from the dorsal pole of the ovary and

passes to the shell gland which it penetrates at some point on its dorsal aspect, describing in its more or less horizontal course a well-marked curve with its convexity dorsad.

Laurer's canal leaves the oviduct from some point more or less close to the shell gland and opens on the dorsum by a minute pore slightly to the right (twice) or to the left (fig. 70) (three times) of the median line and from about 60μ to 320μ cephalad of the excretory pore. It will be remembered that in the 5 specimens studied the ovary was found on the right side in 3; in 1 only of these 3 specimens did Laurer's canal open to the right of the median line, in the other 2 it opened to the left of this line. In the 2 of the 5 specimens in which the ovary was found on the left side, Laurer's canal opened on the left side in one and to the right in the other. It may therefore be

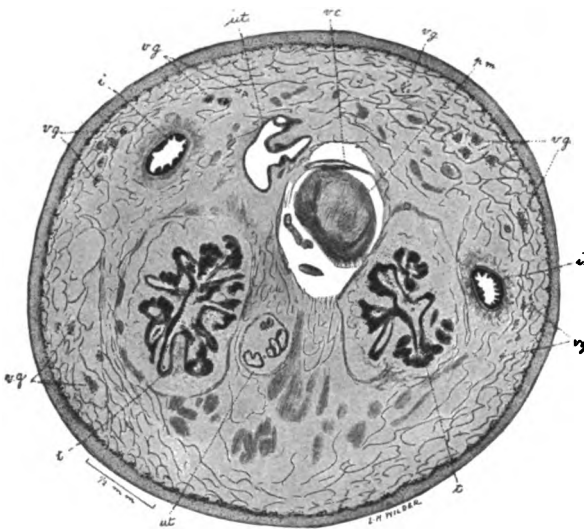


FIG. 69.

easily understood that the path described by Laurer's canal in its course to the dorsal opening varies widely. In general it may be said that this canal, after leaving the oviduct, passes diagonally to the other side of the median line over the excretory vesicle to gain the dorsal aspect of the latter, then proceeds dorso-

caudad to the opening on the dorsal surface. In the minority of cases (2 in 5) the canal remains on the side (either right or left) in which it takes origin, skirts the lateral margin of the excretory vesicle as it proceeds dorso-caudad, gains the dorsal aspect of the vesicle and opens on the dorsal surface on the same side of the median line with its point of origin.

The vitellaria, consisting of sparsely scattered insignificant follicles, occupy the lateral fields of the body external to the intestinal ceca. They extend longitudinally from about the level of the equator of the sucker to about the level of the cecal extremities of the intestines. A duct leaves each gland at a point a little caudad of the level of the superior margin of the acetabulum and passes transversely inward with a more or less marked tilt cephalad, ventrally of the correspond-

ing testis, to unite with its fellow close to the caudo-ventral aspect of the shell gland. From their point of union a duct passes dorsad skirting the caudal or one of the caudo-lateral margins of the shell gland to penetrate the latter at some point at its caudo-dorsal aspect.

Within the shell gland this vitello-duct joins with the oviduct to form a common canal which almost immediately forms a fusiform ootype. The direction of the ootype is ventrad or ventro-cephalad, sometimes with a slight tilt to either the right or left. The ootype is continued as the uterus which emerges at some point on the ventral or ventro-lateral aspect of the shell gland. After emerging the uterus forms some coils ventrad or ventro-mediad of the shell gland; it then winds its way dorsad over the excretory vesicle or skirts one side of the superior portion of the latter. Dorsad of the excretory vesicle several loops dip caudad; it then winds its way cephalad in the dorsal part of the median field, then bends ventrad winding its way beneath the arch of the vasa efferentia close to the caudal aspect of the coiled pars musciosa to reach the ventral aspect of the latter; having reached this point the uterus bends abruptly cephalad and with but few wind-

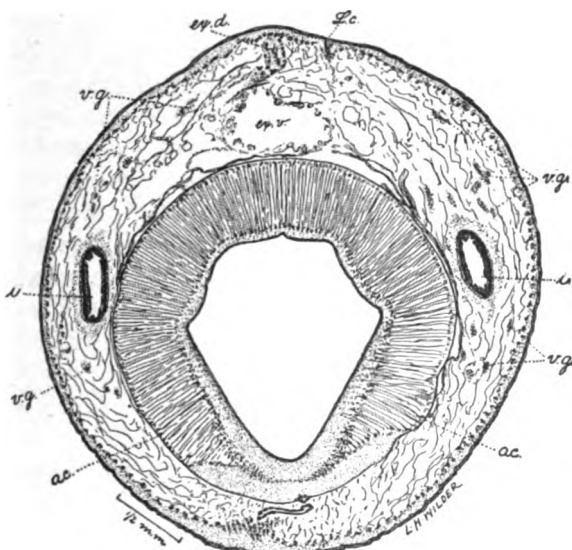


FIG. 70.

ings maintains this relation to the vas deferens throughout the remainder of its course, opening, as has already been mentioned, into the dilated vesicle-like portion of the ductus hermaphroditicus immediately beneath the opening of the ductus ejaculatorius.

Eggs.—Eggs were not observed in any of the specimens.

EXCRETORY SYSTEM.—The excretory system is well developed. A vesicle of moderate dimensions lies dorsally of the acetabulum. From the dorsal aspect of this vesicle from a point which varies considerably in position, but which may be described as at about the junction of the third with the fourth quarter of the length of the vesicle, there arises a moderately thick excretory duct. This duct of somewhat variable length passes at a variable angle caudo-dorsad to open in the

median line of the dorsal surface at or somewhat caudad of the level of the caudal margin of the aperture of the acetabulum, and, as has been described, from 60μ to 320μ caudad of the aperture of Laurer's canal.

ILLUSTRATIONS.

FIG. 57.—Ventral aspect of *P. cauliorchis*, copulatory apparatus evaginated. Enlarged. Original.

FIG. 58.—Profile of same.

FIG. 59.—Ventral aspect, copulatory apparatus invaginated. Enlarged. Original.

FIG. 60.—Profile of same.

FIG. 61.—Ventral projection of *P. cauliorchis* shown in figs. 57 and 58. *g. p.*, position of genital pore; *es.*, esophagus; *i.*, intestinal ceca; *o. s.*, oral sucker; *ov.*, ovary; *s. g.*, shell gland; *t.*, testes; *v. e.*, vasa efferentia. Uterus and vas deferens not shown; *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f* planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 62.—Profile projection of *P. cauliorchis* shown in figs. 57 and 58. *ac.*, acetabulum; *g. p.*, genital pore; *d. e.*, ductus ejaculatorius; *es.*, esophagus; *ex. p.*, excretory pore; *ex. v.*, excretory vesicle; *g. pap.*, genital papilla; *i.*, intestinal ceca; *L. c.*, Laurer's canal; *o. s.*, oral sucker; *ov.*, ovary; *p. m.*, pars muscosa; *p. p.*, pars prostatica; *s. g.*, shell gland; *t.*, left testis; *ut.*, uterus; *v. e.*, left vas efferens; *v. s.*, vesicula seminalis; *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f* planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 63.—Profile projection showing genital papilla retracted and lips of genital aperture slightly ajar. Lettering as in fig. 62. Slightly diagrammatic. Enlarged. Original.

FIG. 64.—Transverse section at *a-a*, figs. 61 and 62. Shows oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), mesenterium-like strands (*m. b.*). Enlarged. Original.

FIG. 65.—Transverse section at *b-b*, figs. 61 and 62. Shows base of oral sucker (*o. s.*), the esophagus (*es.*), origin of intestinal ceca (*i.*), and some vitelline follicles (*v. g.*). Enlarged. Original.

FIG. 66.—Portion of a transverse section to show valve at junction of pars muscosa (*p. m.*) and pars prostatic (*p. p.*); *i.*, intestinal ceca; *va.*, metraterm. Enlarged. Original.

FIG. 67.—Portion of a transverse section at *c-c*, figs. 61 and 62, to show evaginated copulatory apparatus. *g. pap.*, genital papilla; *va.*, metraterm; uterus (*ut.*). Enlarged. Original.

FIG. 68.—Transverse section at *d-d*, figs. 61 and 62. Shows pars muscosa (*p. m.*), vesicula seminalis (*v. s.*), pars intermedia (*p. i.*), valve at junction of vesicula and muscosa (*v. m.*), uterus (*ut.*), right vas efferens (*v. e.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 69.—Transverse section at *e-e*, figs. 61 and 62. Shows position and relations of the cauliflower-like testes (*t.*), uterus (*ut.*). Caudal margin of pars musculosa (*p. m.*), arch of union of the vasa efferentia (*v. e.*), the intestinal ceca (*i.*), and the vitellaria (*v. g.*). Enlarged. Original.

FIG. 70.—Transverse section at *f-f*, figs. 5 and 6. Shows acetabulum (*a c.*), excretory vesicle (*ex. v.*), excretory duct (*ex. d.*), Laurer's canal (*L. c.*), vitellaria (*v. g.*), and intestines (*i.*). Enlarged. Original.

PARAMPHISTOMUM CRASSUM, new species.

[Figs. 71 to 80.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body 6.12 to 6.5 mm. long by 4.2 to 4.76 mm. broad; color drab (alcohol material); in ventral view broad pyriform, greatest transverse diameter at junction of equatorial and caudal thirds; tapers gradually cephalad to plane of genital pore, then abruptly, then gradually to blunt oral pole; caudad it tapers rapidly, so that caudal margin is very bluntly rounded; longitudinal axis curved, convexity dorsad; in transverse section transversely elliptical. Surface with transverse grooves, more marked on venter; cephalic cone with acnelike papillae, which become more acuminate and slender around oral aperture. Genital pore ventro-medial in suctorial zone at junction of oral with second fifth of body; at this point there is a slight ventral elevation. Acetabulum large, ventral, 3.1 mm. in transverse, by 2.74 mm. in dorso-ventral diameter, sunken into body, cavity deep, aperture very small, 0.5 mm. in transverse diameter, directed slightly ventrad. Mouth subterminal; oral sucker very large, 1.34 mm. long, 1.26 mm. broad, 0.98 mm. thick, its lumen broad and shallow, papillated; perisuctorial space narrow; esophagus shorter than sucker, bent U-shaped, convexity ventrad; ceca run at first latero-cephalad, then in wavy to zigzag course to zone of acetabular aperture, then turn slightly cephalad and end about at equator of acetabulum. Excretory pore opens at postovarial plane; canal short, thick; vesicle large, dorsal of acetabulum, extends from preovarian plane into zone of acetabular aperture, and is crossed by Laurer's canal.

Male organs.—Testes large, cauliflower like, in intercecal area, diagonal, zones overlap, fields overlap; vasa efferentia arise from lateral aspect, run cephalad, then dorso-mediad, uniting slightly postequatorial, in zone of anterior testis; vesicula seminalis loosely coiled; musculosa complexly and compactly coiled, connected with vesicularia by a pars intermedia; prostatica nearly straight; ductus ejaculatorius pierces a well-developed muscle mass and opens with metraterm into a slit-like space at base of minute genital papilla, and continued as ductus ejaculatorius, which opens at apex of genital papilla.

Female organs.—Ovary dextral of median line, in acetabular zone, partly in testicular zone, in field of anterior testis, smaller than testis; shell gland dorso-caudad of ovary and nearer median line; vitellaria consist of sparsely scattered follicles, extending from plane of genital pore to slightly postcecal; uterus extends in coils from shell gland cephalad, turns caudad ventrally of left testis, cephalad dorsally of same, under arch of vasa efferentia, ventrally of vesicle to the same slit-like space into which the ejaculatorius discharges; Laurer's canal extends from oviduct dorso-caudad, crosses excretory vesicle and opens submedian, about 0.7 mm. caudad of excretory pore.

Eggs.—Not observed.

TYPE.—U.S.N.M. 7156 (Coll. Hassall).

HABITAT.—In (organ ? of) *Bos indicus*, India.

SOURCE OF MATERIAL.—The material consisted of 3 specimens found with other forms in bottle 5775, collected by Doctor Giles in 1893 in India (Sanawaar, Punjab), from *Bos indicus*. These specimens were given the number U.S.N.M. 7156.

EXTERNAL CHARACTERS.

SIZE.—Two of the specimens, measured in glycerin alcohol, were 6.5 mm. long; the third specimen measured in sections was 6.12 mm. long. The greatest transverse diameter of one of the specimens, measured in glycerin alcohol, was 4.20 mm., while that of another specimen measured in sections was 4.76 mm.

COLOR.—The worms are of a drab color.

FORM.—The form of these worms is shown in fig. 71. They somewhat resemble *Paramphist. cauliorchis*. The greatest transverse diameter is at about the junction of the equatorial with the caudal third of the body length. From this region, in the direction of both poles, the breadth of the animal becomes progressively reduced, rapidly toward the caudal pole, making this extremity broad and rounded, more gradually toward the oral pole until the level of the genital pore is reached. Here there is a rather abrupt reduction in the transverse diameter, clearly shown in fig. 71. Beyond this point the progressive reduction in breadth is very gradual, so that the lateral margins of this oral portion of the worm are very nearly straight lines, whereas the other portions of

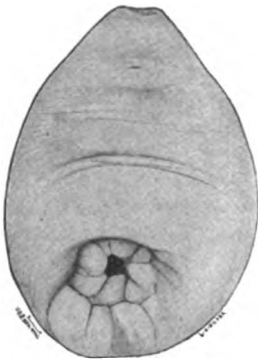


FIG. 71.

the lateral margins of the worm are decidedly curved. The dorso-ventral diameter is relatively shorter in this form than in *Paramphist. cauliorchis*, so that when viewed ventrally it gives the impression of being more decidedly flattened. Viewed in profile it is seen that the longitudinal axis of the worm is curved with the concavity of the curve ventrad. The outline of the worm in transverse section is transversely elliptical.

SURFACE.—The surface cuticle is without spines or hooks, but is marked by transverse grooves, which are best defined and deepest on the ventral surface. The cephalic cone-like portion is beset by acne-like papillæ. In the region immediately around the oral aperture the papillæ become somewhat acuminate and appear slender and somewhat more raised above the general cuticular surface.

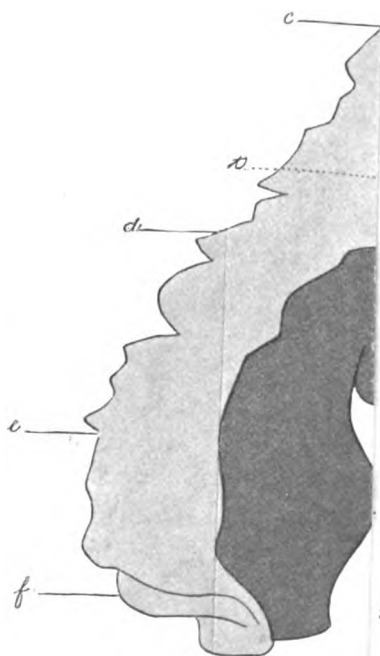
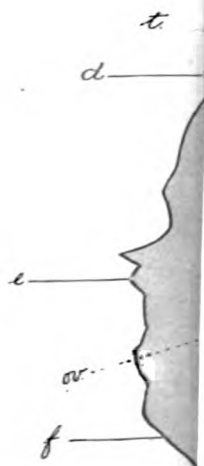
Genital pore.—In the median line of the ventral surface, at about the junction of the oral with the second fifth of the body, there is a transverse buttonhole-like slit, measuring in one alcohol specimen

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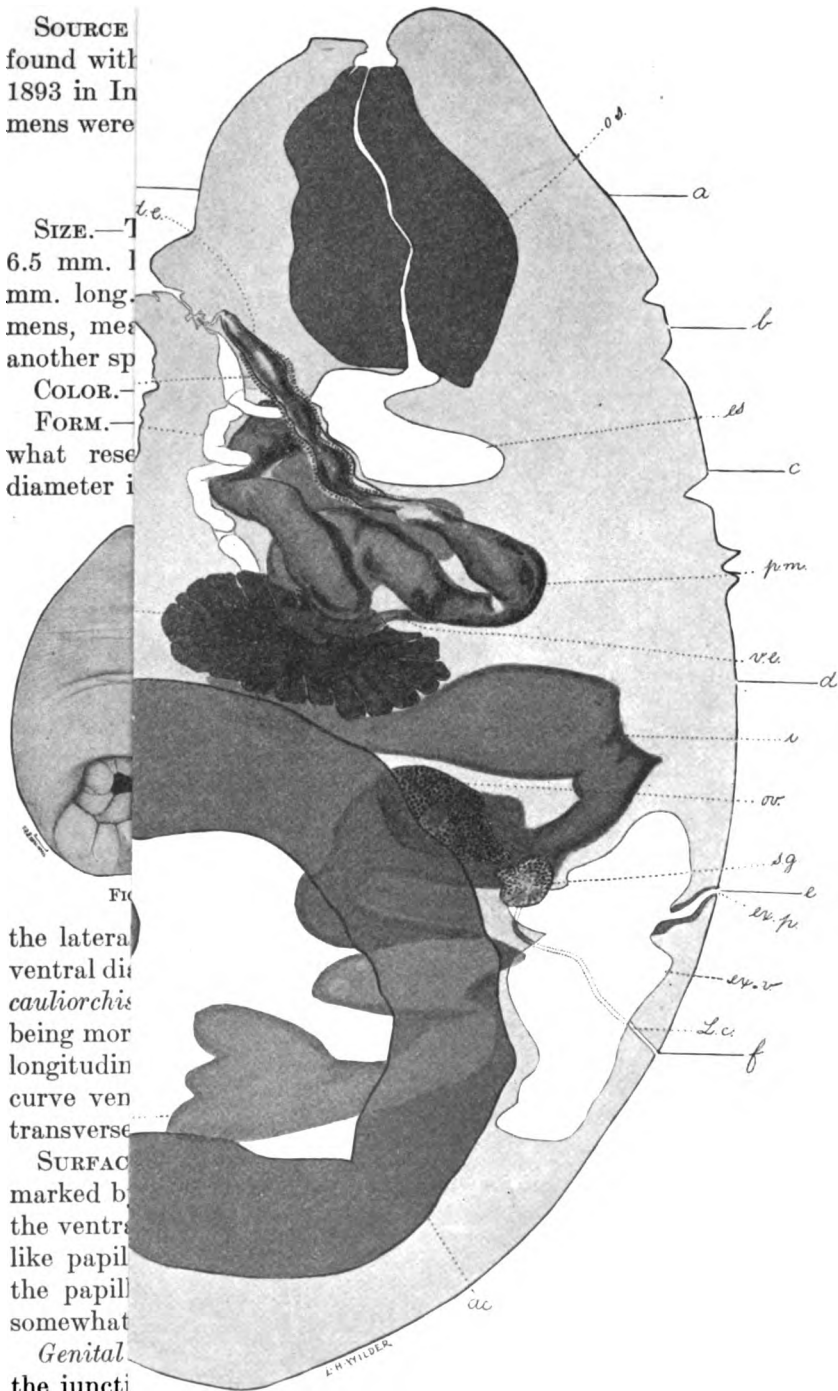


FIG. 73.

about 0.45 mm. in length. This slit, or slit-like depression, is at the vertex of a moderate, transversely elongate elevation, and represents the genital pore.

Acetabulum.—The acetabulum is large, and, as in the other forms of this group, it is in the caudal portion of the body. Its relatively small aperture is directed slightly ventrad on account of the curve of the body. Measurements taken from the projection of one sectioned specimen give 2.74 mm. as the greatest dorso-ventral and 3.10 mm. as the greatest transverse diameter of the acetabulum, with 0.34 mm. as the greatest verticle and about 0.50 mm. as the greatest transverse diameter of the acetabular aperture. The true aperture of the acetabulum is somewhat reduced in size by being

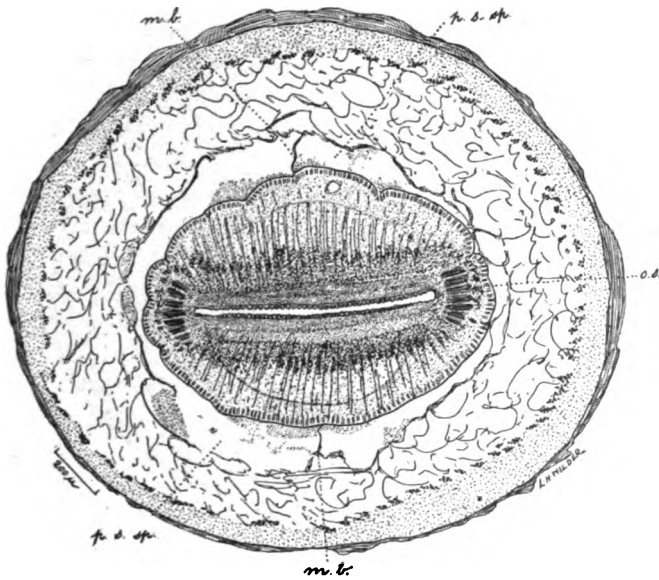


FIG. 74.

encroached upon by folds of the adjacent body surface, much as in the case of *Paramphist. cauliorchis*.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The cephalic pole is marked by an irregularly circular aperture, measuring in section 90μ by 120μ in diameter. This aperture leads into a shallow irregular cavity which gives entrance to the oral sucker. The latter is a large muscular organ, which in projection of one specimen measured 1.34 mm. in longitudinal axis, 0.98 mm. in greatest dorso-ventral diameter, and 1.26 mm. in greatest transverse diameter. The dorsal and ventral walls are thick, measuring 0.46 mm. and 0.50 mm. in thickness, respectively,

when measured in the greatest dorso-ventral diameter of the sagittal plane. Laterally these muscular plates are thinner and continuous one with the other. The organ is inclosed in a narrow space in the body parenchyma (figs. 74, 75), in which it is retained in position by attachments at its two poles and by dorsal and ventral mesenterium-like strands. The lumen of the sucker is a dorso-ventrally, very narrow, but transversely quite broad, cavity. In transverse sections it appears as a transverse slit lined by a thin cuticle-like layer, which is beset by short conical papillæ; the latter are largest in the oral half of the lumen, become gradually smaller and more slender in the direction of the esophageal end, near which they disappear altogether. The esophagus springs from the caudal or basal aspect of the sucker, then describes a more or less well-marked U-

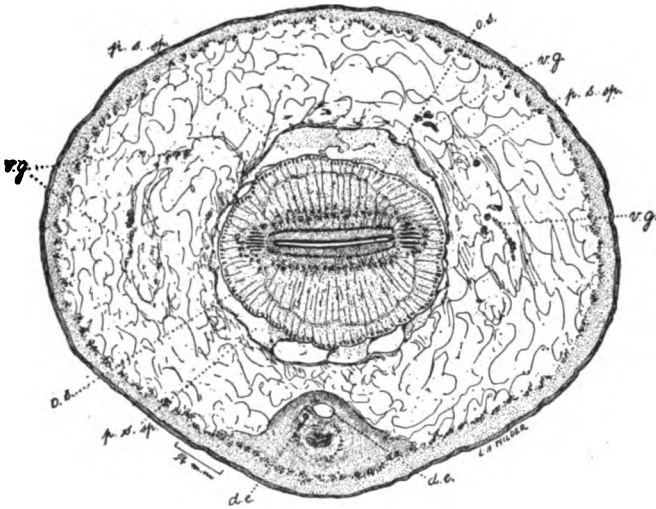


FIG. 75.

shaped course with the base of the U ventrad. The caudal limb of the U is much the longer and is directed almost horizontally dorsad, having only a slight tilt caudad; it divides into the 2 intestinal ceca. These at first pass laterad with a tilt cephalad to a plane slightly above their plane of origin, describing at the same time a slight curve having its convexity dorsad. After approaching the ventro-lateral aspect of the body wall, each of the intestinal tubes bends caudad and describes a decidedly wavy, almost zigzag, course caudad, approximately parallel to the lateral body wall of the worm. The cecal extremities are directed ventrad close to the sides of the acetabulum and at about the level of the upper margin of the acetabular aperture.

The lumen of the esophagus is lined by a cuticle-like layer continuous with that of the oral sucker, but terminating abruptly at the

point of origin of the ceca. The latter are lined by an epithelial cell layer.

GENITAL SYSTEM.—With the exception of the vitellaria, the genital organs are disposed in the intercecal space.

Male organs.—The testes are in the equatorial zone of the worm, one laterad of the other, and separated by a moderate interspace. They are in separate but more or less overlapping testicular zones and fields (fig. 72). In both of two sectioned specimens the right testis was the more cephalad. In transverse sections the testes appear to be composed of numerous lobules suggesting a cauliflower-like appearance (fig. 78). From the external aspect of each testis there emerges a vas efferens, which tends at first cephalad, then dorso-mediad, finally uniting with its fellow to form the vas deferens (fig. 72). The vas deferens is distinctly divisible into a vesicula, musc-

losa, prostatica, and ductus ejaculatorius. The vesicula is loosely but complexly coiled, thin walled, and but slightly dilated. It is succeeded by a complexly and somewhat more compactly coiled musc-

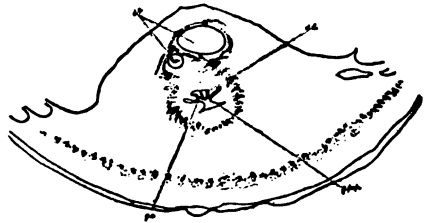


FIG. 76.

losa. This segment is muscular but of less diameter and both much thinner walled and of smaller caliber than the musc-
losa. The change from musc-
losa to prostatica is clearly marked by a
change in the structure of the wall and by the appearance of a thin
layer of cells which inclose this third portion of the vas deferens.
The prostatica is not coiled, but pursues a direct course cephalo-
ventrad. As it nears a prominent somewhat globular muscular
mass, which incloses the terminal genital (copulatory) apparatus,
the prostatic cells are lost, and the prostatica now continues as the
ductus ejaculatorius. It penetrates this muscular mass in close
relation to the dorsal aspect of the terminal portion of the uterus.
This portion of the male duct is still of considerable caliber and
thin walled, giving the impression of a vesicle, but after a very
short course becomes abruptly reduced to a relatively very narrow
and short canal, which is interpreted as opening with the termi-
nal portion of the uterus into a minute slit-like space at the base of
a minute genital papilla (fig. 75). The latter is pierced in its long
axis by a very delicate canal, interpreted as the ductus hermaphro-

diticus. The genital papilla is interpreted as retracted into the body of the worm. Leading from it is a canal, which terminates at the surface in the genital pore. The walls of this canal are indented as seen in figure 73. When evaginated a structure is probably produced, which may in a general way resemble the corresponding structure in *Paramphist. cauliorchis*. The termination of the ductus hermaphroditicus at the vertex of the minute genital papilla is the porus hermaphroditicus, and in the evaginated condition of this terminal (copulatory) apparatus this pore would probably appear on the surface. None of the 3 specimens, the subject of this study, presented this structure in an evaginated state.

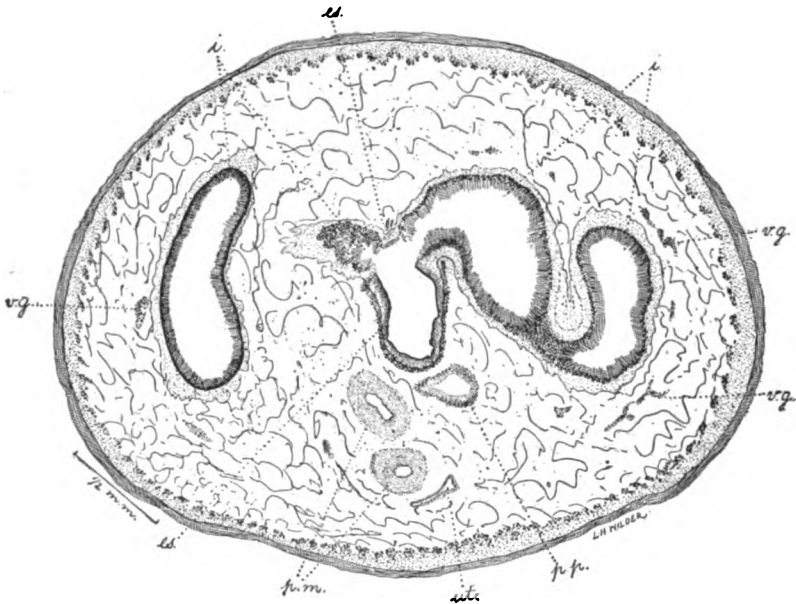


FIG. 77.

Female organs.—In both of the sectioned specimens the ovary was to the right of the median line (fig. 72), considerably caudad of the right testis. Its zone overlaps the zone of caudal portion of that of the left testis to a variable extent. The oviduct arises from the caudal aspect of the ovary, passes in a more or less sinuous course to the left toward the shell gland, the right aspect of which it penetrates. The shell gland lies a little to the left of the ovary in both of the sectioned specimens. In one of these this places the shell gland in the median line, in the other slightly to the right of this line. In both of the sectioned specimens the zone of this gland slightly overlaps the caudal portion of the ovarian zone, and in one also the caudal portion of the left testicular zone. The common vitello-duct penetrates the caudal aspect of the shell gland and is joined at an angle in the sub-

face a little to the right or to the left of the median line; in one sectioned specimen, about 0.72 mm. caudad of the excretory pore.

The vitellogene glands consist of sparsely scattered follicles in the area between the intestinal ceca and the ventro-lateral, lateral, and dorso-lateral margins of the body. They extend in a vertical direction from about the level of the genital pore to a plane slightly caudad of the cecal terminations of the intestines. From each gland a duct passes more or less directly transversely inward, ventrad of the corresponding intestine, to unite with its fellow near the ventro-caudal aspect of the shell gland, between the latter and the acetabulum. From their point of union a duct, the common vitello-

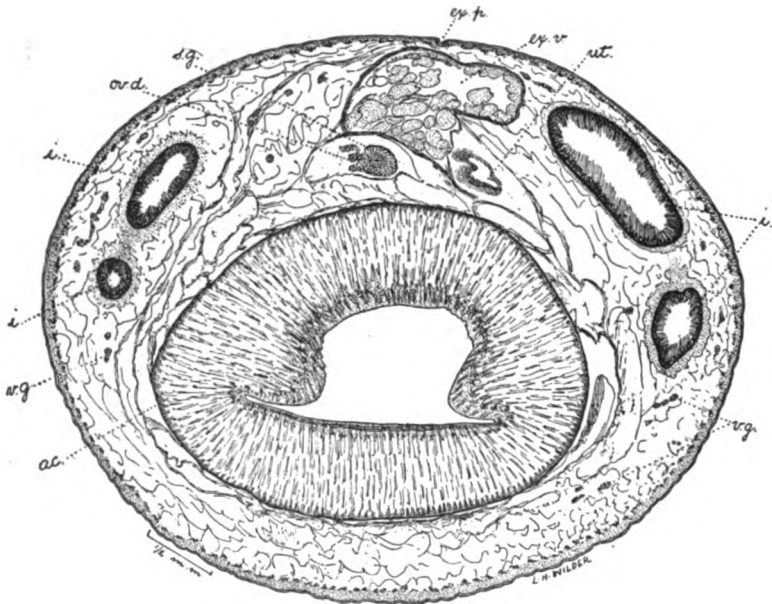


FIG. 79.

duct, passes to the shell gland, penetrating it on its caudal aspect as has already been described.

EXCRETORY SYSTEM.—The excretory system is well developed. A fairly large excretory vesicle is situated between the dorso-cephalic aspect of the acetabulum and the dorsum of the worm. A little caudad of the dome of this vesicle a thick duct leaves it and passes obliquely dorso-cephalad to open on the dorsal surface a little caudad of the superior margin of the acetabulum.

ILLUSTRATIONS.

FIG. 71.—Ventral aspect. Enlarged. Original.

FIG. 72.—Ventral projection of specimen shown in fig. 71: *ac.*, acetabulum; *g. p.*, position of genital pore; *es.*, esophagus; *i.*, intes-

tinal ceca; *ov.*, ovary; *o. s.*, oral sucker; *s. g.*, shell gland; *t.*, testes; *ut.*, uterus; *v. e.*, vasa efferentia; *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 73.—Profile projection of same: *ac.*, acetabulum; *d. e.*, ductus ejaculatorius; *es.*, esophagus; *ex. v.*, excretory vesicle; *ex. p.*, excretory pore; *i.*, intestines; *L. c.*, Laurer's canal; *ov.*, ovary; *o. s.*, oral sucker; *p. m.*, pars musculosa; *p. p.*, pars prostatica; *s. g.*, shell gland; *t.*, right testis; *ut.*, uterus; *v. e.*, right vas efferens; *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 74.—Transverse section at *a-a* figs. 72 and 73. Shows oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*) and mesenterium-like strands (*m. b.*). Enlarged. Original.

FIG. 75.—Transverse section at *b-b*, figs. 72 and 73. Shows caudal portion of oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), ductus ejaculatorius (*d. e.*), and vitellaria (*v. g.*). Enlarged. Original.

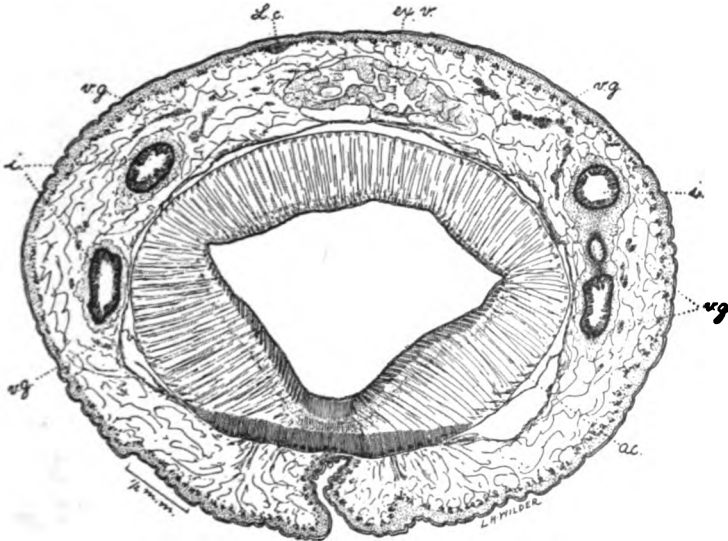


FIG. 80.

FIG. 76.—Portion of fig. 75. To show on a larger scale the copulatory apparatus: *d. e.*, ductus ejaculatorius; *d. h.*, ductus hermaphroditicus; *g. a.*, genital atrium; *g. pap.*, genital papilla. Enlarged. Original.

FIG. 77.—Transverse sections at *c-c*, figs. 72 and 73. Shows esophagus (*es.*) forking into the intestinal ceca (*i.*), the uterus (*ut.*), pars musculosa (*p. m.*), pars prostatica (*p. p.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 78.—Transverse section at *d-d*, figs. 72 and 73. Shows the testes (*t.*), uterus (*ut.*), intestinal ceca (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 79.—Transverse section at *e-e*, figs. 72 and 73. Shows excretory pore (*ex. p.*), excretory vesicle (*ex. v.*), shell gland (*s. g.*), oviduct (*ov. d.*), uterus (*ut.*), vitellaria (*v. g.*), intestinal ceca (*i.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 80.—Transverse section at *f-f*, figs. 72 and 73. Shows pore of Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), vitellaria (*v. g.*), intestinal ceca (*i.*), and acetabulum (*ac.*). Enlarged. Original.

PARAMPHISTOMUM PAPILLOSUM, new species.

[Figs. 81 to 91.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body between 5.12 and 6 mm. long by 2.6 mm. in maximum breadth; gray-brown ochre tint (alcohol specimen); somewhat conical, greatest diameters (transverse and sagittal) about at border of



FIG. 81.

equatorial and caudal thirds; tapers gradually to quite a blunt oral extremity; caudal extremity broadly rounded when viewed ventrally or dorsally, but beveled on its ventral aspect; lateral margins nearly straight; transverse section circular; surface coarsely grooved transversely, especially on venter; oral pole with numerous very minute conical papillæ. Genital pore ventro-median, about one-fourth the length from oral margin, and at transverse plane of caudal margin of pharynx. Acetabulum ventro-subterminal, sunken beneath surface, relatively large, 1.8 to 1.9 mm. in diameter, with small 0.36 mm. circular aperture, mouth terminal crateriform, closely beset with small digitate papillæ; oral sucker large, 0.8 mm. long, 0.9 mm. broad, 0.64 mm. in sagittal diameter, the oral two-thirds of its lumen with small papillæ; esophagus short, strongly flexed ventrad, extends beyond genital pore about to border between oral and equatorial thirds of body; intestinal ceca very long, at first transverse, then turned caudad and extend in very wavy course, each about midway between median line and corresponding lateral margin, more dorsal than ventral, nearly or quite to aperture of acetabulum; slings distinctly dorso-ventral and somewhat parallel to body wall. Excretory pore dorso-median, slightly caudad of cephalic margin of acetabulum and cephalad of Laurer's canal; excretory vesicle well developed, broad; excretory canal arises about from equator of vesicle, short, runs directly dorsad to its pore.

Male organs.—Testes deeply branched, cauliflower like, in axis of equatorial region of body, close together one caudo-dorsad of the other; each vas efferens arises from lateral aspect, passes cephalo-dorsad, then mediad, uniting with its fellow somewhat cephalo-dorsad of anterior testis to form the much-coiled vesicula seminalis; pars muscosa thick walled, coiled, ventral of vesicula; pars prostatica relatively straight, passes ventro-cephalad, ventral of esophagus, is continued in a short ductus ejaculatorius which opens into dilated ductus hermaphroditicus; the latter pierces the axial region of genital papilla, which is separated from a papillated cylindrical antechamber by a nonpapillated ridge or ring; the papillated chamber opens externally through the apparent genital pore. Cirrus pouch absent.



FIG. 82.

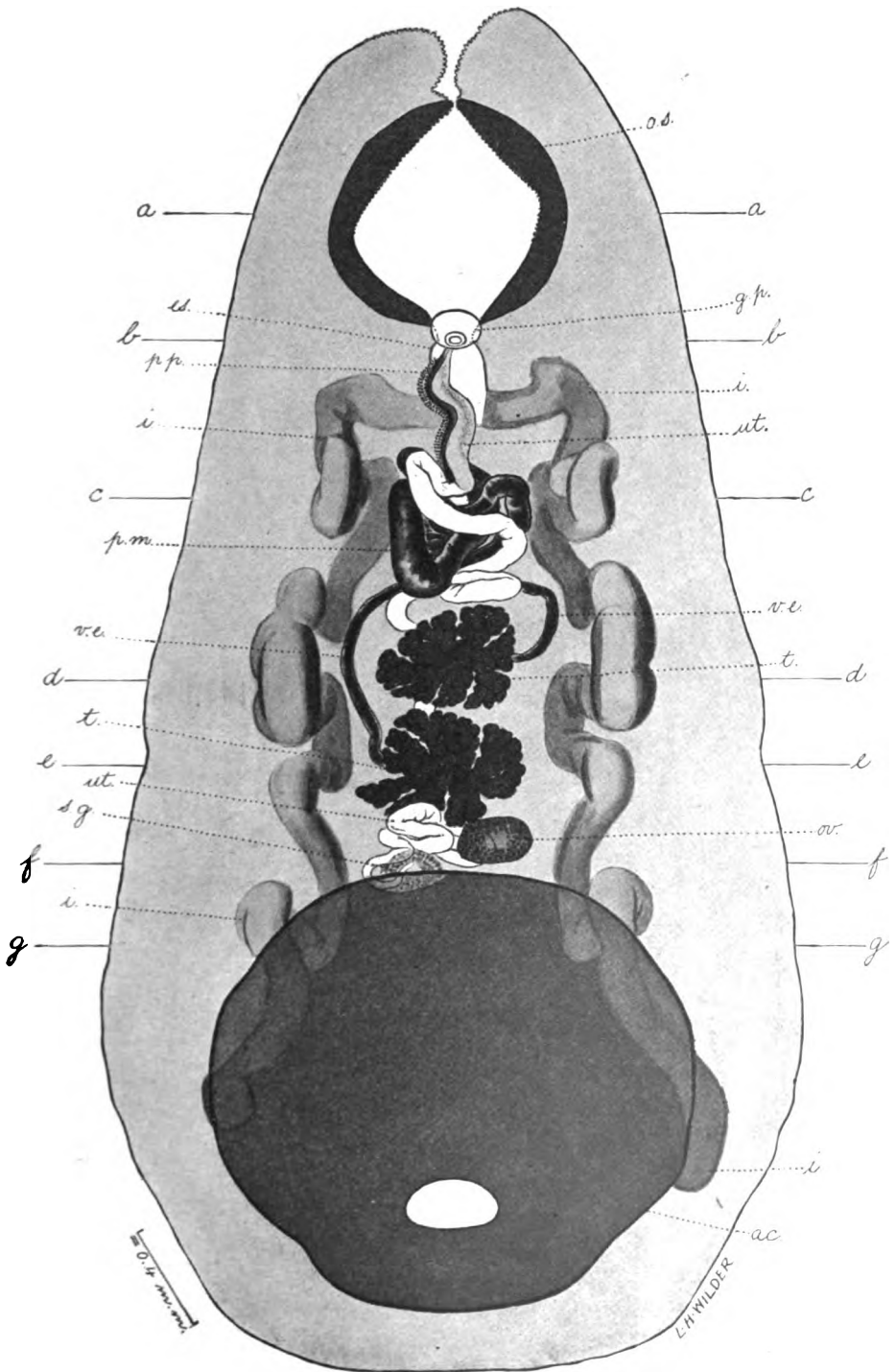


FIG. 83.

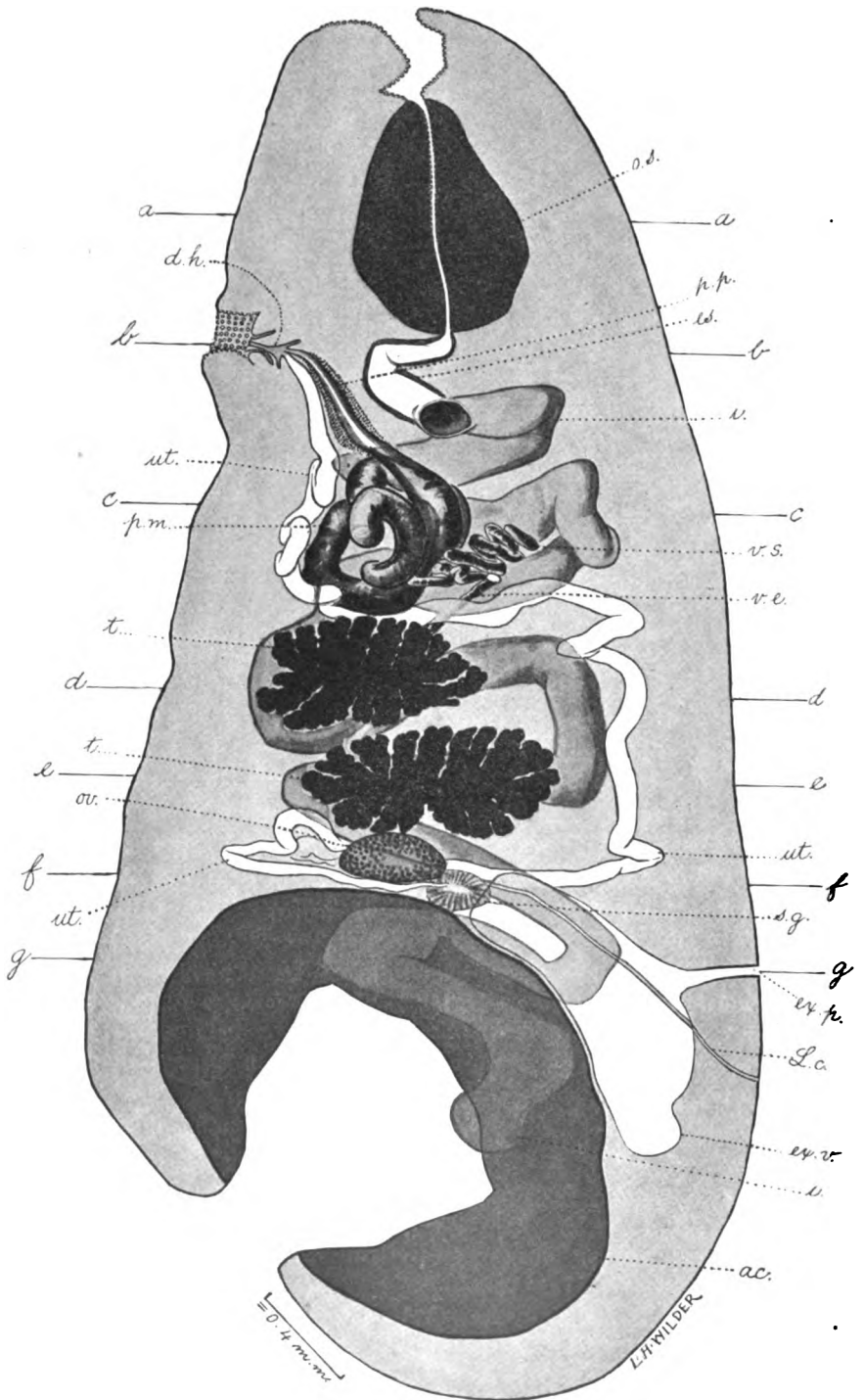


FIG. 84.

Female organs.—Ovary slightly sinistral, slightly ventral, immediately cephalad of acetabulum; shell gland smaller than and dorso-dextro-caudal of ovary; also slightly dextral of median line; vitellaria with sparsely scattered small follicles, lateral of ceca, extending from base of oral sucker to caudal end of ceca; uterus passes from shell gland ventrad caudally of ovary, then coils ventrally of ovary, then passes dorsad between shell gland and testis on right of ovary, dorsally around testes, ventrad beneath vasa efferentia, cephalad ventrally of vas deferens, opening ventrally of ductus ejaculatorius into ductus hermaphroditicus. Laurer's canal runs dorso-caudad at right of excretory vesicle to a point 0.4 mm. caudad of excretory pore, and slightly dextral of median line.

Eggs.—Not observed.

TYPE.—U.S.B.A.I. 15025, sectioned.

HOST.—The Zebu (*Bos indicus*) at Sanawaar, Punjab, India.

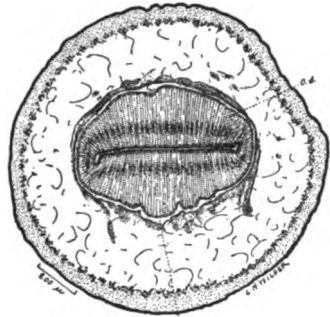


FIG. 85.

SOURCE OF MATERIAL.—This single specimen was found in a bottle with other forms bearing the B. A. I. No. 1723; it was renumbered 15025. The label in this bottle reads as follows:

Name *Amphistomum crumeniferum*. Host *Bos indicus*. Locality Sanawaar, Punjab, India. Collected by Doctor Giles. Date III. 1893. Determined by Dr. Giles. Date III. 1893. Presented by Dr. Giles. Date III. 1893.

EXTERNAL CHARACTERS.

SIZE.—Measured from sections the worm was 5.12 mm. long and 2.6 mm. in greatest width; in alcohol it was 6 mm. long.

COLOR.—The worm was of a gray-brown ocher tint.

FORM.—The form of this worm is well shown in figs. 81 and 82. The worm has a somewhat conical shape, having its greatest transverse and dorso-ventral diameters in the region of junction of the middle with the caudal third whence it tapers gradually to quite a blunt oral extremity. The aboral pole is broad and rounded from side to side, but beveled on its ventral

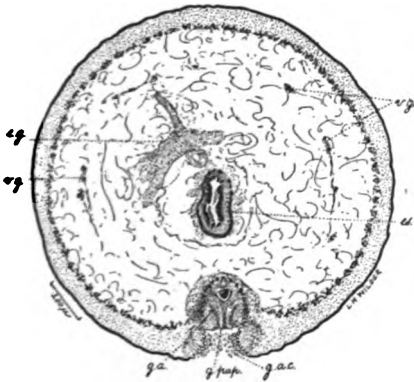


FIG. 86.

aspect where it presents the aperture of the acetabulum. In transverse section the outline is circular.

SURFACE.—The surface cuticle is coarsely grooved transversely, particularly on the venter. At the oral pole there appear to be numerous very minute conical papillæ.

Genital pore.—In the median longitudinal line of the venter about one-fourth the length from the oral extremity is a small aperture, the genital pore, measuring about 0.20 mm. in diameter.

Acetabulum.—The acetabulum is in the caudal portion of the body, distinctly sunken beneath the body surface in the specimen examined. It is relatively large, measuring about 1.8 to 1.9 mm. in diameter, but is provided with a rather small circular aperture which measures 0.36 mm. in diameter; the portion of the rim of the aperture formed by the body of the worm (as distinguished from the portion formed by the acetabulum) is slightly puckered (fig. 82).

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The oral pole of the worm presents an irregularly crateriform depression, closely beset by numerous, small digitate papillæ. This depression leads by a minute irregularly circular aperture into a large muscular oral sucker.

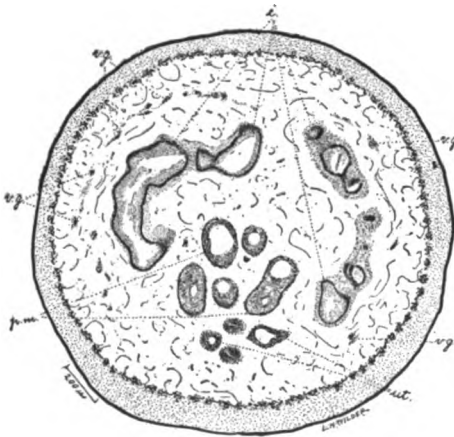


FIG. 87.

This depression leads by a minute irregularly circular aperture into a large muscular oral sucker. The latter is about 0.86 mm. long, about 0.90 mm. in greatest width and 0.64 mm. in greatest ventro-dorsal diameter; it lies in a cavity (fig. 85), suggestive of a rudimentary body cavity, and is bound to the body parenchyma at its oral and aboral poles and by distinct mesenterium-like bands on both its dorsal and its ventral median aspects.

In median sagittal section it is somewhat pyriform in outline; in frontal section it is almost circular, while in transverse section (fig. 85) it is elliptical in outline. The muscular wall is thickest in the ventro-dorsal and thinnest in the transverse axis. The lumen is a transversely broad, dorso-ventrally narrow slit-like space and is lined by a thin cuticle-like layer seemingly (no sagittal sections available for confirmation) in anatomical continuity with the surface cuticle. In about the upper (cephalic) two-thirds of the lumen the lining is beset by very small slender conical papillæ; these give to the cuticle a serrate appearance (transverse sections), with the papillæ of the dorsal wall fitting into the interspaces between the papillæ of the ventral wall.

At the two extremities of the oral sucker the lumen becomes contracted so as to form at each end a small circular aperture; at the

caudal extremity this aperture gives entrance into the esophagus; very slightly caudally of this point may be distinguished a well developed ganglion-complex (fig. 86), lying dorsally of the esophagus and sending off strong nerve strands in various directions. The esophagus passes from the base of the sucker and describing a U-shaped course with the base of the U ventrad, divides into two intestines at about the level of junction of the cephalic with the middle third of the body. The intestinal tubes pass one to the right and the other to the left in a transverse plane latero-dorsad to a point about midway between the longitudinal axis and the body wall; they then pursue a wavy course caudad (figs. 83, 84), to terminate by cecal extremities latero-dorsad of the acetabulum about in the transverse plane of the upper (cephalic) margin of the aperture of the acetabulum. In their wavy course caudad the ceca continue in a general way about midway between the longitudinal body axis and the body wall but approaching closer to the dorsal than to the ventral median longitudinal line; furthermore, the slings or coils have a distinctly dorso-ventral direction (figs. 84, 87, 89, 90) and run somewhat parallel to the body wall. The lumen of the esophagus is lined by a thick cuticular layer, which ceases abruptly at the point of origin of the intestines. The latter are lined by an epithelial cell layer.

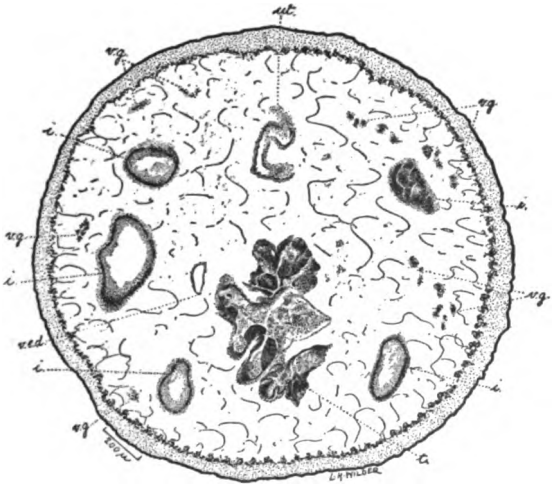


FIG. 88.

GENITAL SYSTEM.—*Male organs.*—The testes, one caudad of the other, are in the axial portion of the equatorial region of the body, though in general slightly nearer the venter than the dorsum (figs. 84, 88, 89); of the two, the superior (cephalic) testis is nearer the venter, and, being somewhat smaller, is also farther from the dorsum than is the inferior (or caudal) testis. The opposing aspects of the testes are closely approximated. Both testes are much branched, suggesting a cauliflower in appearance (figs. 88, 89). (The projections do not show this well.) From the right lateral aspect of the caudal, and from the left lateral aspect of the cephalic testis there

spring the corresponding vasa efferentia; these pass cephalo-dorsad, then mediad, describing an arch as they unite a little above the superior testis to form the vas deferens (fig. 84). Beneath this arch, and between it and the superior testis, the uterus passes ventrad. The vas deferens presents at first a much coiled thin walled portion, (vesicula) the lumen of which in the single specimen studied was not noticeably dilated. This is succeeded by a coiled quite thick walled (45μ) portion, pars musculosa, measuring about 150μ in diameter, which is situated ventro-cephalad of the coiled thin-walled portion. The caliber of this muscular portion appears somewhat greater than that of the vesicula. The muscular portion is succeeded by a relatively straight pars prostatica of moderate length, the walls of which, though thick and muscular at first, rapidly become thinned and are inclosed in a mass of cells. This portion passes ventro-cephalad,

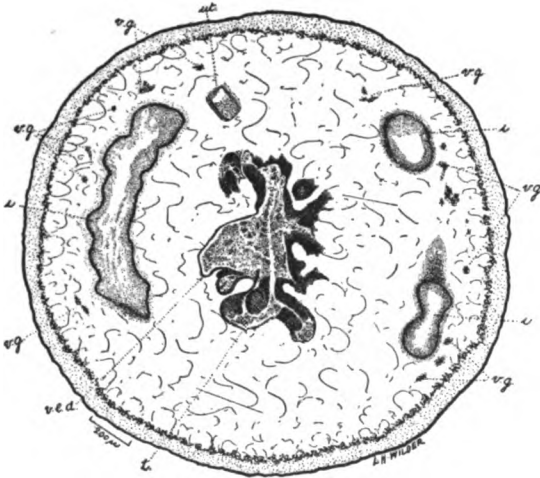


FIG. 89.

being in relation to the ventral aspect of the esophagus, and in still closer relation to the dorsal aspect of the terminal portion of the uterus; it is finally succeeded by a short duct (by homology, the ductus ejaculatorius) not inclosed in prostatic cells and opens by a minute pore immediately above the metraterm into a small slit-like atrium at the base of the genital papilla.

This atrium may be regarded as the dilated dorsal portion of the ductus hermaphroditicus which pierces the axial region of the genital papilla. The genital papilla is embraced by a ring, one aspect of which is applied to it and separated from it only by a narrow slit; the other aspect forms the dorsal wall of a relatively large cylindrical atrium (figs. 84, 86); this latter is beset by small papillæ (hence the specific name *papillosum*), which do not occur, however, on either surface of the ring embracing the genital papilla. The genital pore gives entrance and exit to this chamber, and, as will be seen from figure 84, it is at or slightly caudad of the level of the base of the oral sucker.

Female organs.—The ovary is in the axial region of the body, though a little to the left of the median sagittal plane, and a little nearer to the venter than to the dorsum and just above (cephalad of) the acetabulum. From its dorso-median aspect there arises the

oviduct which passes to the right and dorso-caudad toward the shell gland. The shell gland, somewhat smaller than the ovary, lies a little to the right, and a little dorso-caudad of the ovary (figs. 83, 84, 90) and also slightly to the right of the median sagittal plane of the body of the worm. It is penetrated on its dorso-median aspect by the oviduct and on its dorso-caudal aspect by the vitello-duct. These unite in the substance of the shell gland to form the ootype, which is continued as the uterus, the latter emerging from the ventral aspect of the gland (fig. 90). Laurer's canal leaves the oviduct just before the latter penetrates the shell gland; it then passes to the right and dorso-caudad, skirting the upper portion of the right lateral aspect of the excretory vesicle (figs. 84, 91), and opens on the dorsum about 0.40 mm. caudad of the excretory pore, slightly to the right of the median line.

The vitellogene glands, composed of sparsely scattered insignificant follicles, lie in the lateral regions of the body between the intestinal ceca and the body walls. They extend longitudinally from about the level of the base of the oral

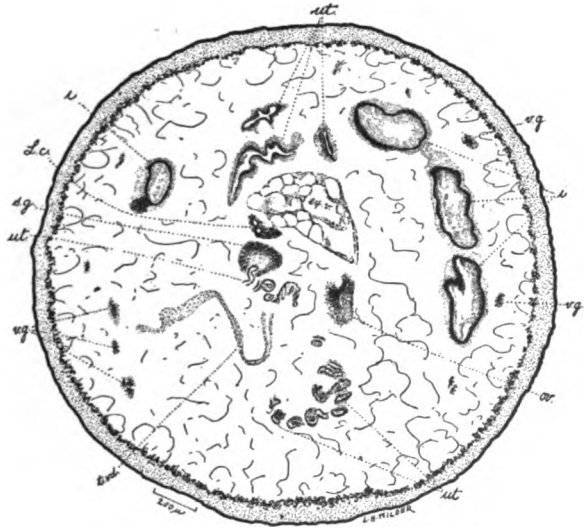


FIG. 90.

sucker to the level of the termination of the intestinal ceca. From each gland there arises a duct, which passes transversely inward ventrally of the intestines; the two unite at the level of the superior margin of the acetabulum and close to the ventro-median aspect of the shell gland. From their point of union a duct is given off which skirts the caudal aspect of the shell gland, penetrating the latter at the caudo-dorsal aspect.

The uterus, as already described, emerges from the ventral aspect of the shell gland (fig. 90), passes ventrad, then for a short distance cephalad forming some coils ventrally of both ovary and shell gland; it then passes dorsad to the right of the ovary and between the shell gland and caudal testis. Having reached the space between the caudal testis and dorsum it passes cephalad behind (dorsally of) both testes, then ventrad above (cephalad of) the superior testis and beneath the arch of union of the vasa efferentia, to gain the ven-

tral aspect of the coil formed by the pars musculosa. It next passes in a general way cephalad and reaches the ventral aspect of the pars prostatica; this relation it maintains in the remainder of its course ventro-cephalad to terminate by a minute pore immediately beneath the pore of the ductus ejaculatorius in the manner already described. In its course the uterus is moderately coiled. Neither eggs nor spermatozoa were observed in its lumen.

EXCRETORY SYSTEM.—The excretory vesicle (figs. 84, 90, 91) lies dorsally of the acetabulum between the terminal portions of the intestinal ceca. Its transverse diameter is greater than its ventro-dorsal diameter; it discharges by a thick walled duct which arises from about the middle of its dorsal aspect; this duct passes almost directly dorsad to open, in the median line, somewhat (about 0.28

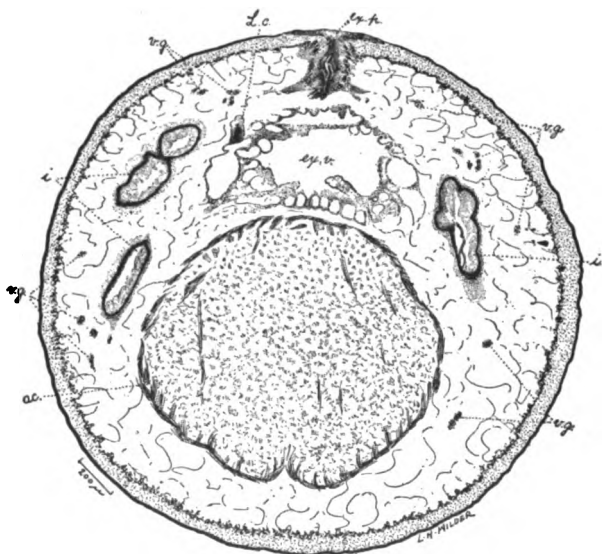


FIG. 91.

mm.) below the level of the upper margin of the acetabulum, and about 0.4 mm. cephalad of the pore of Laurer's canal.

ILLUSTRATIONS.

FIG. 81.—Ventral aspect. Enlarged. Original.

FIG. 82.—Profile of same. Enlarged. Original.

FIG. 83.—Ventral projection of specimen shown in figs. 81 and 82: *ac.*, acetabulum; *g. p.*, genital pore; *es.*, esophagus; *i.*, intestinal ceca; *ov.*, ovary; *o. s.*, oral sucker; *p. m.*, pars musculosa; *p. p.*, pars prostatica; *s. g.*, shell gland; *t.*, testes; *ut.*, uterus; *v. e.*, vasa efferentia. *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 84.—Profile projection of specimen shown in figs. 81 and 82: *ac.*, acetabulum; *d. h.*, ductus hermaphroditicus; *es.*, esophagus; *ex. p.*, excretory pore; *ex. v.*, excretory vesicle; *i.*, intestine; *L. c.*, Laurer's canal; *ov.*, ovary; *o. s.*, oral sucker; *p. m.*, pars muscosa; *p. p.*, pars prostatica; *s. g.*, shell gland; *t.*, testes; *ut.*, uterus; *v. e.*, vas efferens; *v. s.*, vesicula seminalis; *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 85.—Transverse section at *a-a*, figs. 83 and 84. Shows oral sucker (*o. s.*), and perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 86.—Transverse section through *b-b* figs. 83 and 84. Shows papillated genital ventral chamber (*g. a. c.*), genital dorsal chamber (*g. a.*), genital papilla (*g. pap.*), esophagus (*es.*), esophageal ganglion (*e. g.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 87.—Transverse section at *c-c* figs. 83 and 84. Shows uterus (*ut.*), pars muscosa (*p. m.*), intestinal ceca (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 88.—Transverse section at *d-d* figs. 83 and 84. Shows superior testis (*t.*), intestines (*i.*), uterus (*ut.*), right vas efferens (*v. e. d.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 89.—Transverse section at *e-e* figs. 83 and 84. Shows caudal testis (*t.*), origin of right vas efferens (*v. e. d.*), uterus (*ut.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 90.—Transverse section at *f-f* figs. 83 and 84. Shows uterus (*ut.*), right transverse vitello-duct (*t. v. d.*), caudal portion of ovary (*ov.*), shell gland (*s. g.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 91.—Transverse section at *g-g* figs. 83 and 84. Shows acetabulum (*ac.*), intestines (*i.*), excretory vesicle (*ex. v.*), Laurer's canal (*L. c.*), excretory pore (*ex. p.*), and vitellaria (*v. g.*). Enlarged. Original.

PARAMPHISTOMUM INDICUM, new species.

[Figs. 92 to 102.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body 5.25 to 9.5 mm. long by 2 to 3 mm. in maximum breadth; gray-brown ochre (alcohol specimens); somewhat conical, greatest transverse diameter about at border of equatorial and caudal thirds; tapers moderately to blunt, almost truncated oral extremity; caudal extremity rounded on ventral view, but with tendency to beveled ventro-lateral aspect on lateral view; lateral margins nearly straight to slightly curved; body bent, with venter rather strongly concave (longitudinally) and dorsum convex; transverse section circular anteriorly, but with greater transverse than dorso-ventral diameter from near genital pore for some distance caudad, then the dorso-ventral diameter becomes the greater. Surface coarsely wrinkled transversely; cephalic half provided with irregular, transverse rows of papillæ which are more numerous, acutely conical in circumoral region, but more scattered, shorter, broader, and blunt elsewhere. Genital pore ventro-median about at border between cephalic and equatorial thirds of body, caudad of esophagus, but nearer to this than to anterior testis. Acetabulum terminal, but aperture appears ventro-subterminal because of curvature of body, sunken beneath surface,

rather large, 1.6 mm. in longitudinal diameter, very slightly less in transverse diameter, with rather circular to somewhat irregular, 0.53 mm. to 0.65 mm. aperture which appears ventrad and slightly caudad. Mouth terminal, hour-glass form, provided with papillæ; oral sucker large, oval, 0.96 mm. long, 0.84 mm. broad, 0.58 mm. in greatest dorso-

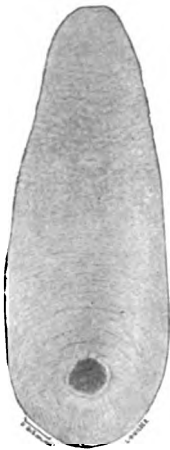


FIG. 92.

ventral diameter, the oral two-thirds of its lumen with small blunt papillæ; esophagus about half as long as sucker, at first directed caudad, then suddenly dorsad, does not extend to genital pore; intestinal ceca long, pursue dorso-ventrally wavy course about to anterior margin of aperture of acetabulum. Excretory pore dorso-median, cephalad of acetabulum, about on caudal plane of caudal testis, and about 1 mm. cephalad of pore of Laurer's canal; excretory duct short, runs from pore to dorso-cephalic aspect of very large excretory vesicle which lies dorsally of cephalic portion of acetabulum.

Male organs: Testes deeply notched (lobulated), in transverse section cauliflower like, in axis of body, one caudad of the other, slightly caudad of equatorial plane, very slightly nearer to venter than to dorsum, one very slightly nearer each lateral margin than is the other; each vas efferens arises from dorsal aspect of testis, passes cephalo-mediad, unites with its fellow about 0.5 mm. cephalad of superior testis to form vas deferens; vesicula seminalis and pars musculoosa both much coiled and extend in ventrocephalic direction; pars prostatica short, nearly straight, directed ventrad; pars ejaculatorius very short, unites with

metraterm dorsally of pore to form ductus hermaphroditicus, which pierces a small papilla to discharge into a narrow nonpapillated atrium, which in turn discharges at the genital pore; cirrus pouch absent.

Female organs: Ovary right or left of median line, just cephalad of acetabulum; shell gland smaller, dorso-median and slightly caudad of ovary; vitellaria with sparsely scattered, very small follicles, lateral to dorso-lateral of ceca, from base of oral sucker to cephalic margin of acetabulum (not quite to end of ceca); uterus passes in wavy course ventrally of shell gland, dorsad caudally of posterior testis, cephalad of both testes, ventrad under arch of vasa efferentia, cephalad ventrally of vas deferens, to ductus hermaphroditicus; Laurer's canal arises from oviduct about midway between ovary and shell gland, runs dorso-caudad at right of excretory vesicle to pore situated on dorsum, 0.8 to 1.0 mm. caudad of excretory pore, and either median or very slightly to the right of median line.

Eggs: Not observed.

TYPE.—U.S.B.A.I. 1723; cotype U.S.N.M. 5775.

HOST.—The Zebu (*Bos indicus*) in Punjab, India.



FIG. 93.

SOURCE OF MATERIAL.—These worms were found with some other forms in 2 bottles, bearing the numbers "B.A.I. 1723" and "U.S.N.M. 5775," respectively. The other material in question has been separated out and renumbered.

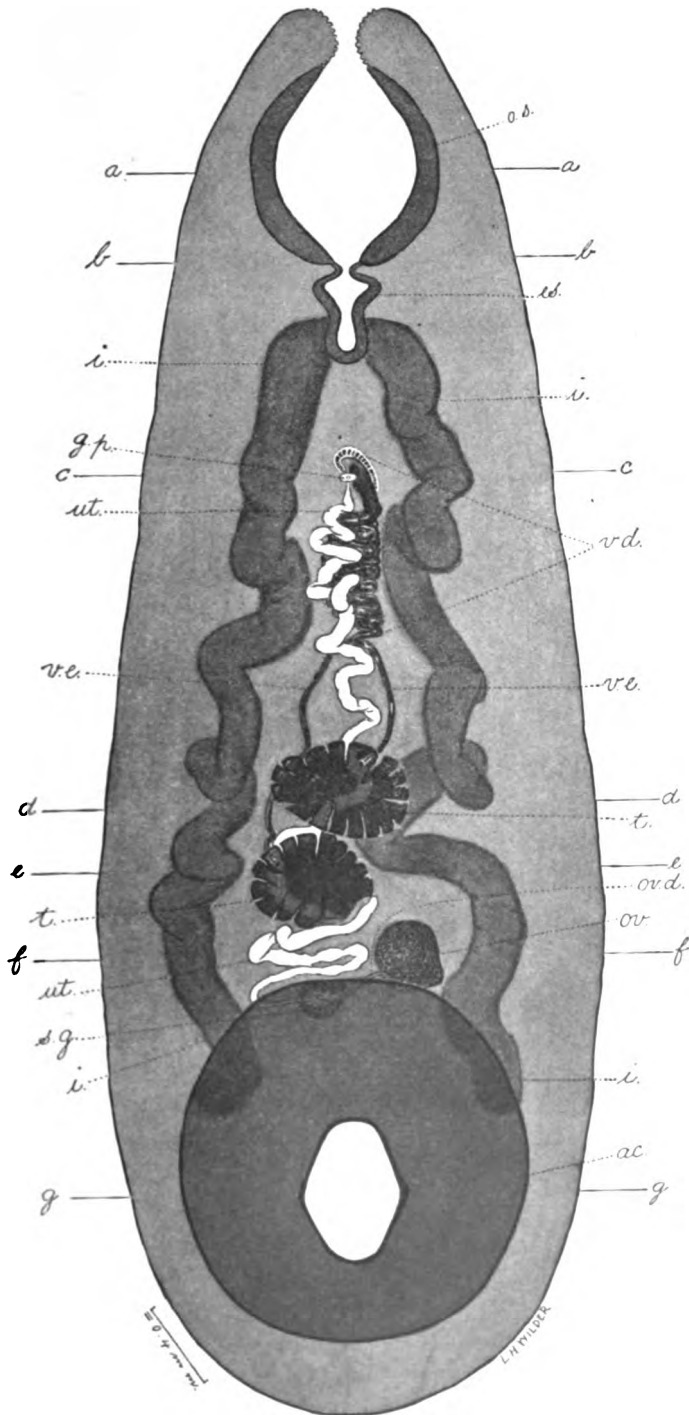


FIG. 94.

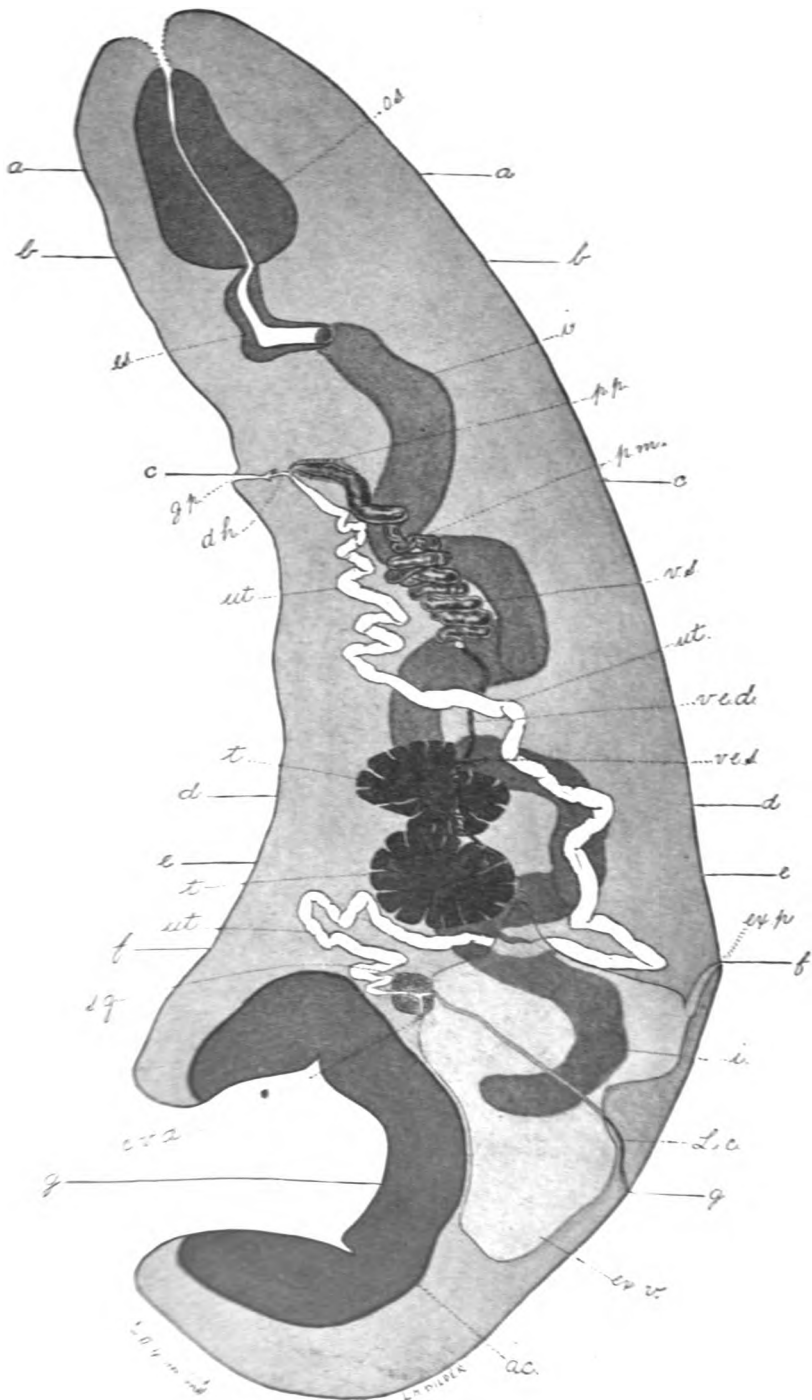


FIG. 93.

EXTERNAL CHARACTERS.

SIZE.—The alcohol preserved specimens—14 in all—measured from 5.25 to 9.5 mm. in length. On account of the damaged condition of 6 of them the width could be measured in 8 only, and in these the maximum breadth varied from 2 to 3 mm.

COLOR.—The worms are of a gray-brown ocher.

FORM.—The specimens are somewhat conical in form (figs. 92, 93) and the ends are bent more or less ventrally, so that the longitudinal axis is a curve with a concave venter and a strongly convex dorsum. The greatest transverse diameter is near the junction of the equatorial with the caudal third of the body; the worm tapers moderately to a blunt, and in some specimens, slightly bulbous oral extremity. On transverse section the cephalic portion is circular, but beginning slightly cephalad of the genital pore the outline undergoes a slight change, the transverse diameter becoming greater than the dorso-

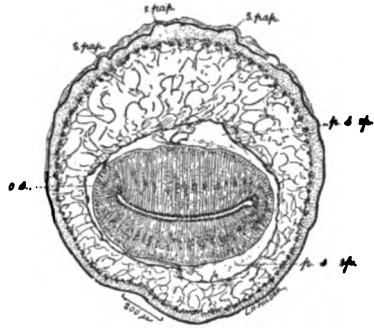


FIG. 96.

ventral diameter; near the caudal end the outline again changes, the dorso-ventral diameter being the greater.

SURFACE.—The surface of the worms, except for some transverse wrinkling, is smooth in the caudal half of the animal; in the cephalic half, however, the cuticle is provided with numerous papillæ, which are acutely conical in the circumoral region,

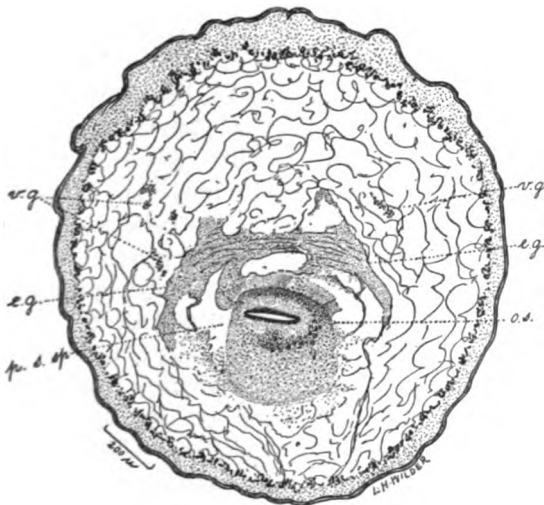


FIG. 97.

but relatively shorter, broader, and more blunt over the remaining portion of the surface covered by them; at least some of these appear to be of sensory nature. The papillæ around the oral aperture are

fairly numerous and closely aggregated; the others are relatively less numerous, more scattered, and arranged in irregular transverse rows.

Genital pore.—In the median longitudinal line of the ventral surface, at about the junction of the cephalic with the middle third of the body, is the genital pore (figs. 94, 95, 98). This gives entrance into a canal which leads into a small nonpapillated atrium, the dorsal wall of which is formed by a short papilla in the center of which is the porus hermaphroditicus. Sections show the genital atrium to be inclosed in considerable muscular mass (figs. 95, 98).

Acetabulum.—This is terminal anatomically, but appears ventro-subterminal because of the curvature of the body. In one of the sectioned specimens it measured about 1.6 mm. in greatest (longitudinal) diameter. Its more or less circular aperture is directed ventrad and slightly caudad, appearing ventro-subterminal, and in 7 specimens varies from 0.53 to 0.65 mm. in diameter.

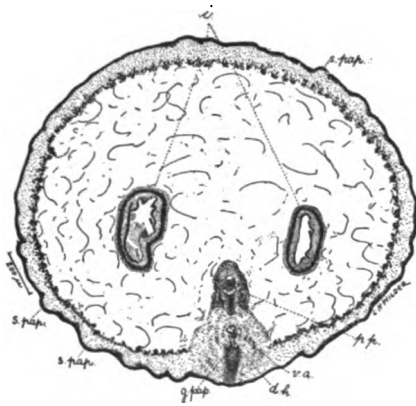


FIG. 98.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The mouth, which pierces the cephalic blunt extremity, leads into a large muscular oral sucker of oval form and rather similar to that of *P. papillosum*. The cephalic two-thirds of the lumen of this sucker is beset with small but distinct bluntly pointed conical papillæ (fig. 96); in the esophageal third there is a

slight indication of much more minute papillæ. The sucker lies in a cavity suggestive of a rudimentary body cavity, held in place by its attachments at its poles and by mesenterium-like bands extending from the dorsal and ventral aspects through the cavity to the body parenchyma. The sucker leads into the esophagus, and dorsally of the point of union there is a distinct nervous band giving off branches in various directions (fig. 97). At first the esophagus passes almost directly caudad, then bending at almost right angles it is directed for the remainder of its short course dorsad to fork into two intestinal ceca. The length of the esophagus is equal to about one-half of that of the sucker. The intestinal ceca pursue a dorso-ventral wavy course (approximately parallel to the body wall) caudad to terminate dorsally of the acetabulum and in a transverse plane just above (cephalad) of the acetabular aperture (figs. 94, 95).

GENITAL SYSTEM.—*Male organs.*—The testes are in the axial region of the cephalic portion of the caudal half of the body, between the equatorial plane and the plane of the cephalic margin of the acetabulum (figs. 94, 95), somewhat nearer to the venter than to the dorsum. The testes are deeply indented or lobulated, so that in transverse section they appear as if branched in cauliflower-like fashion (figs. 99, 100). They are situated almost directly caudad one of the other, their opposing surfaces being either in the same or in slightly separated transverse planes. From the dorsal aspect of each testis arises a vas efferens; in one (figs. 94, 95) of the two sectioned specimens the right vas belonged to the inferior, and in the other to the superior testis. The vasa efferentia pass cephalad, and about 0.5 mm. above the superior testis unite in the axial region of the body to form the much coiled vas deferens. The first portion of the latter is thin walled (vesicula), and its general course is ventro-cephalad. The second portion, also much coiled, is provided with thick muscular walls. The third portion of the vas deferens is short, fairly straight, directed almost horizontally ventrad, and its walls are inclosed in a mass of cells; this, the

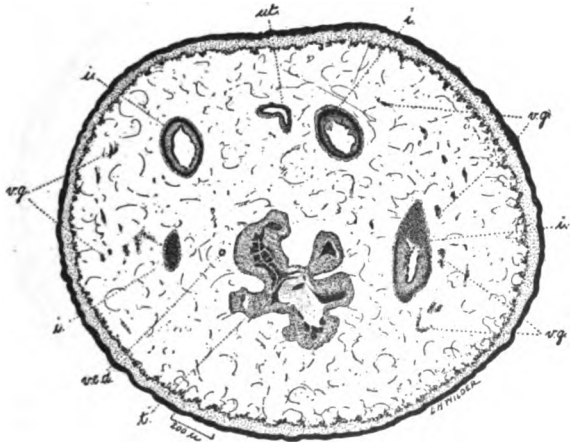


FIG. 99.

pars prostatica, becomes suddenly greatly reduced both in the caliber of its lumen and the thickness of its walls, and now devoid of prostatic cells this terminal (fourth) portion represents a very short ductus ejaculatorius, which unites with the metraterm to form a short ductus hermaphroditicus (fig. 95).

Female organs.—The ovary lies in the superior (cephalic) part of the caudal third of the axial region of the body (fig. 101), a little either to the right or to the left of the median sagittal plane. Its cephalic aspect is in the same transverse plane as, or in the plane immediately caudad of, the plane of the caudal aspect of the caudal testis. The shell gland lies on the dorso-median aspect of the ovary, slightly caudad of and either close to or somewhat removed from the latter. The oviduct springs from the ovary from the aspect nearest the shell gland in one specimen, but very slightly more dorsally in another; it passes toward the shell gland which it penetrates. In the substance

of the shell gland the oviduct unites with the vitelline duct to form the ootype. Laurer's canal leaves the oviduct at a point about midway between the ovary and the shell gland, or slightly nearer the ovary, and passes dorso-caudad, skirts the right side of the excretory vesicle (both in the specimen with dextral and in the one with sinistral ovary), and reaches the dorsal body surface at a point about on a level with the middle of the acetabular aperture and between 0.80 mm. and 1 mm. caudad of the excretory pore. In the specimen with the dextral ovary the pore of Laurer's canal is median, while in the specimen with sinistral ovary it is very slightly to the right of the median line. The vitellogene glands, consisting of sparsely scattered insignificant follicles, lie in the lateral and dorso-lateral regions of the body, between the intestinal ceca and the body surface,

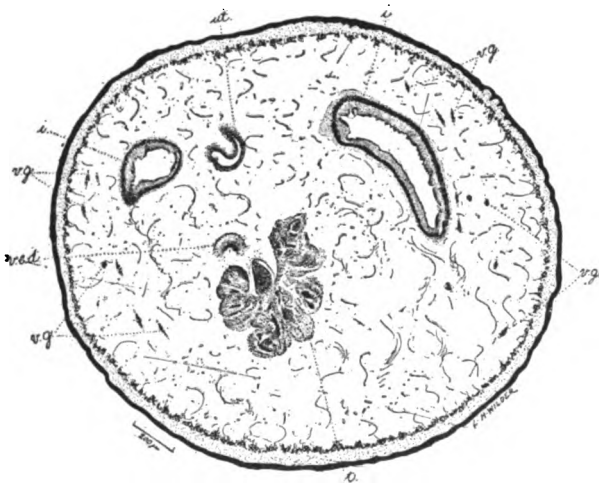


FIG. 100.

and extend longitudinally between the plane of the base of the sucker and that of the upper margin of the acetabulum. The transverse vitello-ducts unite dorsad of the acetabulum and immediately caudad of the shell gland. From their point of union,

which is not dilated into a reservoir, a duct springs which penetrates the caudal aspect of the shell gland.

The uterus, as a continuation of the ootype, emerges from that ventro-lateral aspect of the shell gland which is away from the ovary, and then forms coils ventrad of the shell gland and ovary as it winds its way for a short distance cephalad before it turns dorsad beneath the caudal testis. In its course dorsad it passes to the right of the upper portion of the excretory vesicle. On reaching the region dorso-caudadly of the caudal testis it resumes its course cephalad between the dorsum and the testes; just above the plane of the cephalic aspect of the superior testis it bends ventro-cephalad, passing beneath the arch formed by the union of the vasa efferentia, and gains the ventral aspect of the vas deferens; this relation it maintains in the remainder of its course, its terminal portion or metraterm uniting with the

ductus ejaculatorius to form the ductus hermaphroditicus. Eggs were not observed in the uterus of either of the specimens studied.

EXCRETORY SYSTEM.—The excretory vesicle is large and lies dorsally of the acetabulum, its fundus extending caudad to a plane somewhat above the caudal margin of the acetabulum. The vesicle opens by a short duct which leaves it from the dorso-cephalic aspect and opens on the dorsum a little above the plane of the upper margin of the acetabulum and as already stated almost 1.00 mm. cephalad of the pore of Laurer's canal.

RELATION TO KNOWN SPECIES.

This species resembles most closely *Paramphist. gracile* Fischæder. It differs from the latter in possessing an esophagus that is only about

one-half as long as the sucker; in the position of the testes which in this species are placed relatively farther caudad than in *P. gracile*; in the position of the ovary which in this form is separated little, if at all, in a longitudinal direction from the caudal testis; and in the position of the pore of Laurer's canal which in this form is very much farther caudad, opening about opposite the middle of the acetabular aperture whereas in *P. gracile* it opens in the plane of the superior aspect of the ovary some distance above the upper margin of the acetabulum.

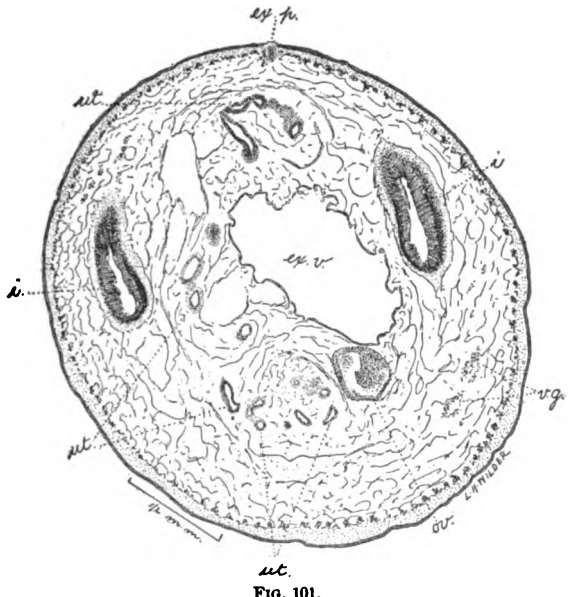


FIG. 101.

whereas in *P. gracile* it opens in the plane of the superior aspect of the ovary some distance above the upper margin of the acetabulum.

ILLUSTRATIONS.

FIG. 92.—Ventral aspect. Enlarged. Original.

FIG. 93.—Profile view of same. Enlarged. Original.

FIG. 94.—Ventral projection of specimen shown in figs. 92 and 93: ac., acetabulum; g. p., genital pore; es., esophagus; i., intestines; ov., ovary; ov. d., oviduct; o. s., oral sucker; s. g., shell gland; t., testes; v. d., vas deferens; v. e., vasa efferentia; ut., uterus. a-a, b-b, c-c,



SUBGENERIC POSITION UNCERTAIN.

The subgeneric position of the following species is left open for the present:

Paramphistomum fraternum, close to the subgenus *Paramphistomum*, very close to *P. explanatum*.

P. siamense, close to subgenus *Paramphistomum*, very close to *P. explanatum*.

P. shipleyi, close to *P. parvipapillatum* and *P. scolicoelium*.

P. parvipapillatum, close to *P. shipleyi* and *P. scolicoelium*.

PARAMPHISTOMUM FRATERNUM, new species.

[Figs. 103 to 113.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body 9.75 mm. long, at least 4.5 mm. in maximum breadth; grayish olive green in color (alcohol specimens); viewed ventrally, conical; viewed laterally, gourd shape; greatest diameter at junction between equatorial and caudal thirds; tapers gradually but considerable to truncated conical oral pole; caudal end bluntly rounded when viewed ventrally, beveled ventrally when viewed laterally; long axis curved moderately, concavity ventrad; dorsum arches both longitudinally and transversely; venter concave longitudinally, convex transversely; transverse sections in general elliptical to semicircular with rounded angles. Surface with fine transverse striations, no papillæ. Genital pore apparently slightly sinistrad (due to torsion?) in suctorial zone about one-eighth of body length from oral pole; shallow genital atrium; genital papilla only slightly elevated. Acetabulum large, ventro-subterminal, 3.75 mm. long, 3.25 mm. broad, aperture 1.85 by 1.52 mm., margins projecting slightly, cavity very deep. Mouth terminal, crateriform, not papillated; oral sucker 0.96 mm. long, 0.98 mm. broad, 0.52 mm. thick, rather oval in outline; perisuctorial space narrow; esophagus about three-fourths as long as sucker; ceca pass at first laterad, then caudad to end at equator of acetabulum, about at junction of third with caudal fourth of body, the ends bending medio-caudad. Excretory pore opens on preacetabular plane (about five-ninths of body length from oral pole) and one-fifth of body length cephalad of pore of Laurer's canal; excretory vesicle crosses Laurer's canal, long, extends postovarian, beyond equator of acetabulum.

Male organs.—Testes equatorial, pre- and acetabular, zones and fields overlap, in extra-, inter-, and cecal areas, very large, lobate; vasa efferentia unite about at junction of oral and equatorial thirds of body; vas deferens highly developed; vesicula seminalis much coiled, extending about from pretesticular plane nearly to bifurcal plane; muscloses short, nearly straight, extends nearly to postsuctorial plane; prostatica much shorter than muscloses; ejaculatorius and ductus hermaphroditicus very short.

Female organs.—Ovary about at equator of acetabulum, at end of ceca, slightly dextrad; shell gland in ovarian zone, slightly sinistrad; vitellaria large, follicles large, in extra-, inter-, and cecal areas, dorsal and ventral of ceca, from slightly above postsuctorial plane to caudal margin of shell gland, hence slightly postcecal; uterus extends from shell gland a short distance cephalad, coils, then ascends a short distance, then coils and becomes very much distended by eggs, passing dorsally of testes and beneath arch of vasa efferentia, then runs in nearly straight course ventrally of vas deferens to discharge into ductus hermaphroditicus; Laurer's canal runs at first cephalo-dorsad, then dorsad to open slightly sinistrad of median line, slightly caudad of preovarian plane, about 1.72 mm. caudad of excretory pore.

Eggs.—Numerous, operculated, 120 by 67.5 μ .

TYPE.—B.A.I. 3066.

HABITAT.—In (organ? of) *Buffelus indicus*.

SOURCE OF MATERIAL.—The 2 specimens forming the collection were in a bottle bearing the B.A.I. No. 3066, the label in which bore the following information:

Name *Amphistomum explanatum*. Host *Buffelus indicus*. Determined by Prof. A. Railliet. Date 1899. Presented by Prof. A. Railliet. Date 1899.

The specimens are in poor condition; one is greatly distorted, having its cephalic third bent acutely ventrad; the other also appears somewhat distorted by irregular shrinkage, but is sufficiently preserved for study, and the following description is based chiefly upon it.



FIG. 103.

EXTERNAL CHARACTERS.

SIZE.—Measured in alcohol this specimen was 9.75 mm. in greatest length and 4.5 mm. in greatest transverse diameter. After embedding and sectioning, the length (calculated from the sections) was found to be 8.94 mm., the greatest transverse diameter 4.10 mm., and the greatest dorso-ventral diameter 4.4 mm. The measurement of the greatest transverse diameter was unsatisfactory on account of the distortion by flattening in that region of the worm; this measurement is therefore regarded as considerably under what it would be in the perfect specimen.

COLOR.—The specimens were of a grayish olive-green color.

FORM (figs. 103, 104).—The greatest dorso-ventral and transverse diameters are in about the region of junction of the middle with the caudal third of the body. From this region it tapers gradually but considerably toward the oral pole, which appears relatively sharply pointed; a short length of the terminal portion is contracted into a small truncated cone. The aboral pole remains broad and thick and rounded, and may be considered as beveled at the expense of its ventral aspect, where it presents the terminal irregularly circular acetabular aperture. The longitudinal axis of the worm is moderately curved with its concavity ventrad.

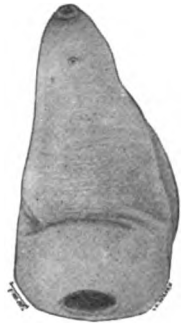


FIG. 104.

The dorsum is arched both longitudinally and transversely, whereas the venter is concave longitudinally and convex from side to side; this convexity, however, is much less marked than that of the dorsum and in certain regions almost disappears. Transverse sections are in a general way elliptical in outline, but in the region where the transverse convexity of the venter almost disappears, the outline approaches that of a semicircle with rounded angles.

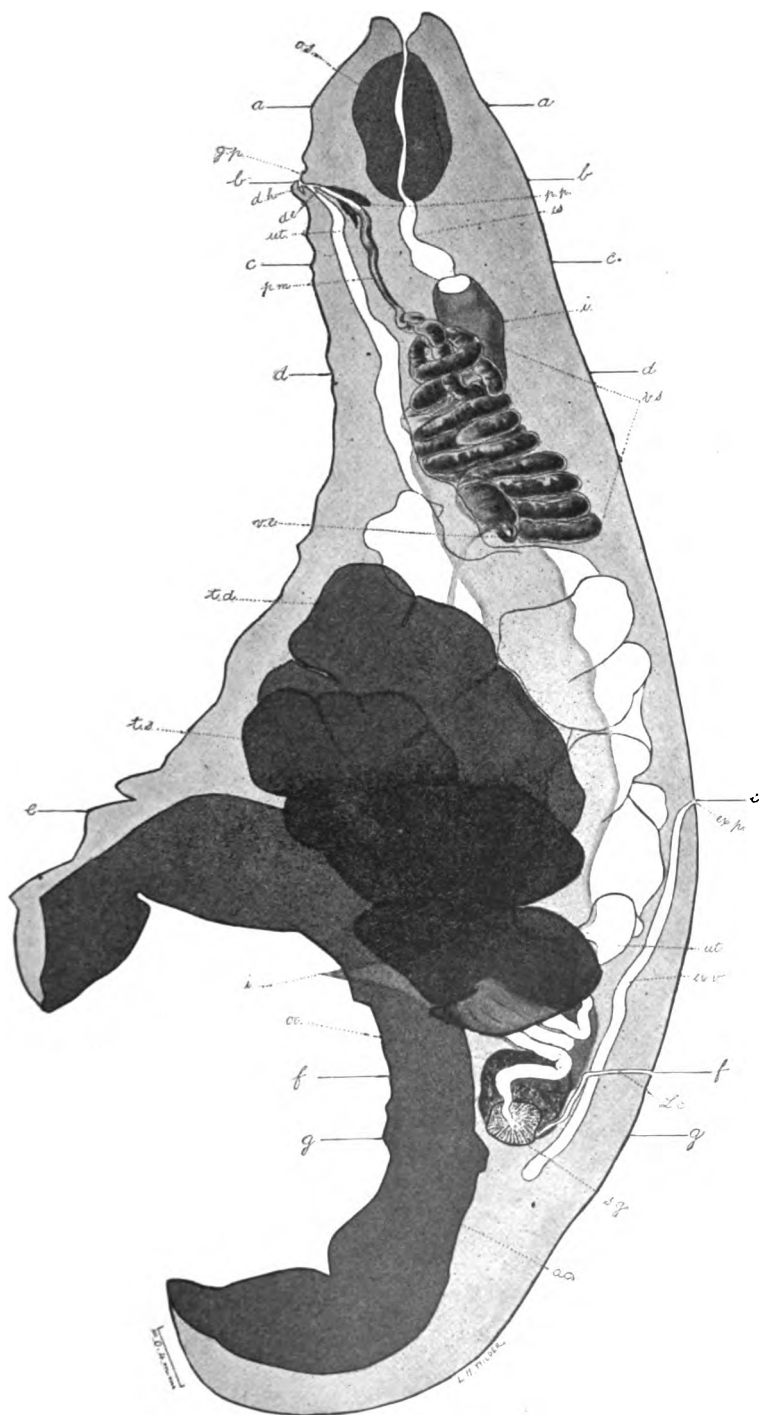


FIG. 105.

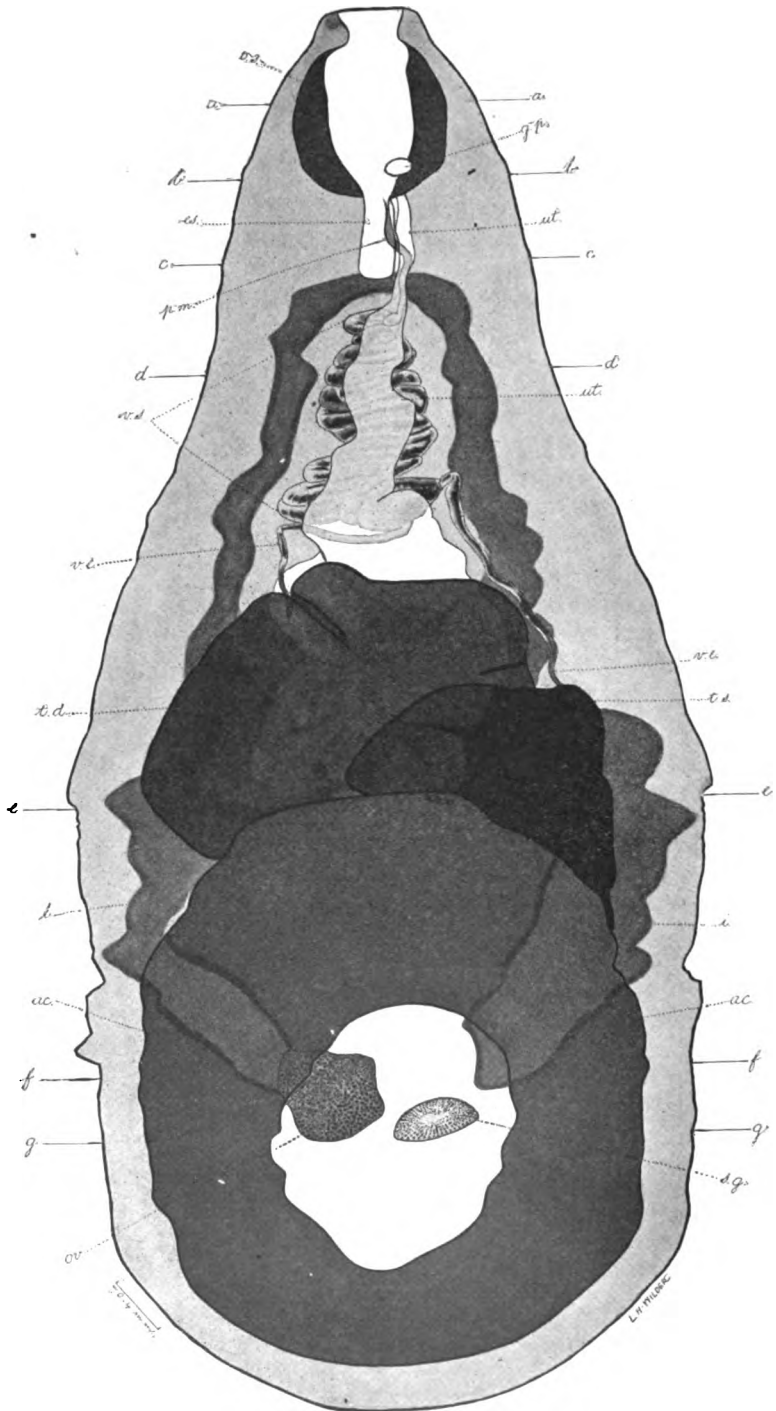


FIG. 106.

SURFACE.—The surface cuticle presents fine transverse striations, best marked near the oral extremity. There are also irregularities of the surface, which are probably due to irregularities in contraction in the process of fixing and in the preservation.

Genital pore.—On the ventral surface apparently slightly to the left of the median longitudinal line and at about one-eighth of the body length from the oral extremity is a small bulging, on the vertex of which may be noted a small (160μ) transversely elongate button-hole-like pore, the genital pore (figs. 104, 108). This pore leads into a relatively shallow chamber, which is almost entirely filled by a plump, slightly elevated, genital papilla which arises from what corresponds to the dorsal wall of the chamber. At the vertex of

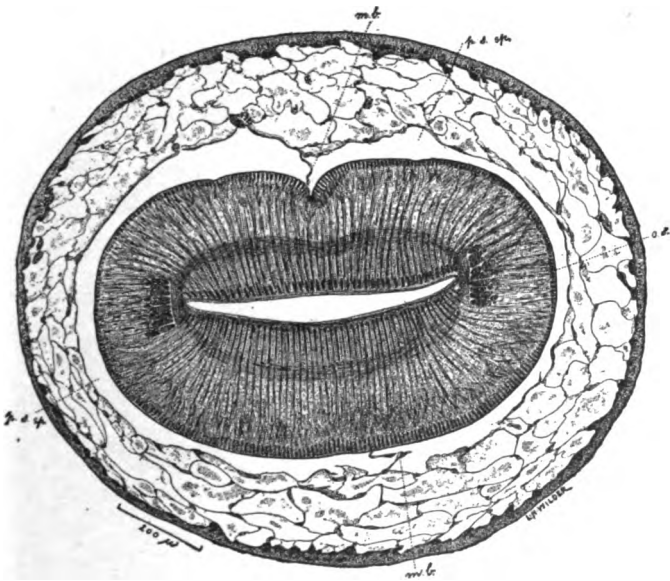


FIG. 107.

this papilla is an orifice, the porus hermaphroditicus, the external termination of the ductus hermaphroditicus.

Acetabulum.—This muscular organ is in the caudal portion of the body. On account of the curvature of the longitudinal axis of the worm its aperture is tilted slightly ventrad and gives the appearance of a ventral bevel to the caudal extremity of the worm. The dome of the acetabulum (measured in projection of one sectioned specimen) was about 3.75 mm. in vertical by about 3.25 mm. in transverse diameter with an aperture about 1.85 mm. in vertical by about 1.52 mm. in transverse diameter. The margin of the acetabular aperture is formed by the slightly projecting muscular rim of the acetabulum itself, a thin, closely applied layer of the body parenchyma extending to its margin but not overlapping it, so that the aperture

appears to have a narrow enclosing lip, which is readily discernible on the surface, where it is marked off from the general body surface by a shallow groove (figs. 104, 106, 112, 113).

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The cephalic extremity of the worm presents a transversely elliptical crateriform depression, the base of which presents the oral aperture. The latter leads directly into a muscular oral sucker. No papillæ were observed. The sucker is relatively small, measuring in projection about 0.96 mm. in length, with a maximum transverse diameter of 0.98 mm. and with a maximum dorso-ventral diameter (measured in median sagittal plane) of 0.52 mm. In both sagittal and frontal planes it is of an oval outline;

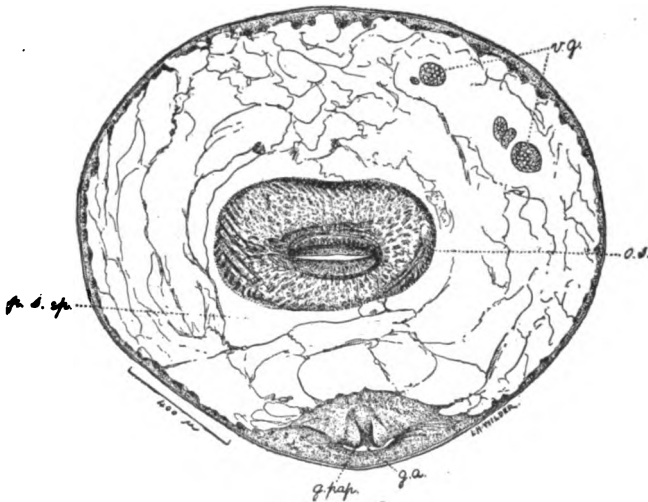


FIG. 108.

in transverse section it has the form of an ellipse with its major axis corresponding to the transverse diameter of the worm (fig. 107). The lumen of the sucker is a dorso-ventrally narrow, transversely broad space; in transverse section in the region of its equator the form of the lumen is somewhat that of a spindle. The body of the sucker is inclosed in a narrow perisuctorial space, in which it is retained in position by attachments at both its poles and by dorsal and ventral dorso-ventral strands. The lumen is lined by a thin, smooth, cuticle-like layer. The esophagus springs from the base of the sucker, passes directly caudad for about half its length, then bending slightly, passes dorso-caudad to divide into two lateral ceca at a point slightly nearer the dorsum than the venter and about one-fifth of the body length from the oral extremity. The length of the esophagus is

about three-fourths that of the sucker. Its anterior extremity is slightly caudad of the level of the genital pore. In the first half of its course the lumen of the esophagus maintains substantially a uniform diameter; in the second half, however, it dilates moderately but distinctly and with some abruptness. The esophagus is lined by a cuticle-like layer and is inclosed in a scant layer of sparsely scattered cells.

The intestines pass at first laterad from their point of origin from the esophagus, then, describing a curve, they pass directly caudad in fairly close proximity to the dorso-lateral aspect of the body. Their form in transverse section is very irregular and their caliber varies greatly at different levels. They terminate by cecal extremities dorsad of the acetabulum and slightly caudad of the center of the

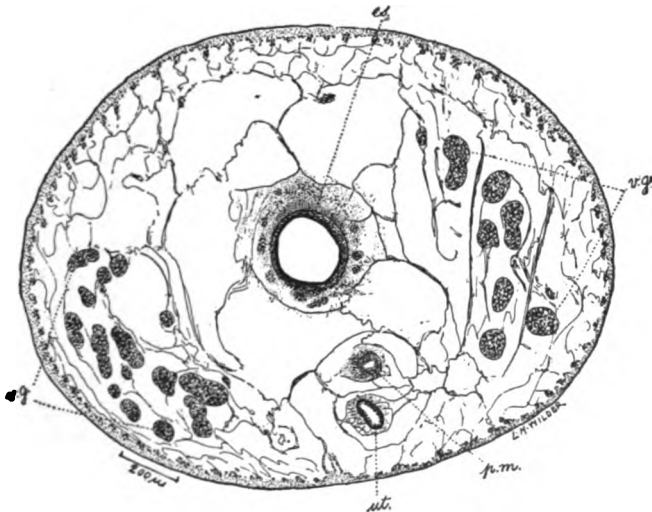


FIG. 100.

aperture, or at a level somewhat caudad of the junction of the third with the caudal fourth of the body. They are lined by an epithelial cell layer.

GENITAL SYSTEM.—With the exception of the vitellogene glands, the genital organs lie in the intercecal area.

Male organs.—The two testes are large irregular masses. One is a little to the right of the other and a little nearer the oral extremity, so that their zones and their fields overlap to a considerable extent (figs. 105, 106, 111). The testis from which the right vas efferens springs lies in the equatorial fifth of the worm and is a little to the right and at a slightly higher level than the testis from which the left vas efferens springs. The latter testis is therefore somewhat farther from the oral extremity and overlaps the left side of the caudal

portion of the ventral aspect of the right testis. Both testes are indented by deep fissures which mark off large lobes. A vas efferens emerges from the dorsal aspect of each testis. On account of the relative positions of the testes, the right vas is much the shorter. They at first pass more or less directly cephalad; then a little above the cephalic aspect of the right testis they pass transversely inward, forming an arch beneath which the uterus passes as they unite in the formation of the vas deferens. The first portion of the vas deferens is a relatively thin walled, long, intricately and compactly coiled vesicula, the lumen of which is dilated and filled with spermatozoa (figs. 105, 106, 110). It is succeeded by a relatively short, uncoiled, and almost straight pars muscosa (figs. 105, 106, 109). The change from one to the other is quite abrupt. The muscosa has a relatively small lumen and its walls, though more muscular and thicker than

that of the vesicula, are not very greatly developed. Its direction is cephalo-ventrad.

At a point in a transverse plane slightly caudal of that of the base of the sucker this duct becomes inclosed in a mass of cells and its external layer of longitudinal muscle fibers becomes much thinned; this is the beginning of the pars prostatica.

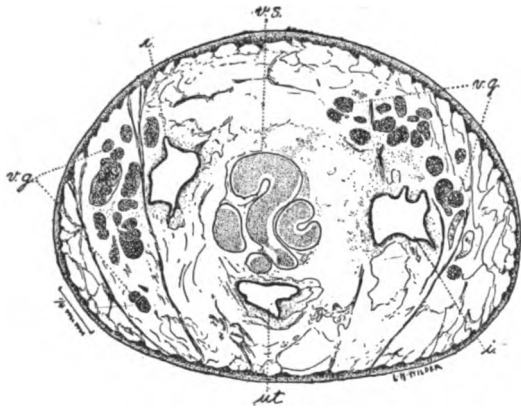


FIG. 110.

The pars prostatica (fig. 105) is both absolutely and relatively quite short and is succeeded by the ductus ejaculatorius. The ductus ejaculatorius is quite short, its walls more delicate than those of the prostatica, and the change from one to the other is marked by the disappearance of the prostatic cells. At the base of the genital papillæ the ductus ejaculatorius and the uterus unite to form the ductus hermaphroditicus which pierces the genital papilla and terminates at the vertex of the latter at the porus hermaphroditicus. The genital papilla and the wall of the genital atrium are inclosed in a sharply defined mass of muscular fibers (fig. 108).

Female organs.—The ovary lies in the caudal portion of the body, slightly caudad of the plane of junction of the third with the caudal fourth of the body, dorsad of the dome of the acetabulum, and a little to the right of the median sagittal plane. The oviduct springs from the caudo-mesial aspect of the ovary and passes transversely to the left toward the shell gland, near which it appears to fork into two ducts (fig. 113). The forking takes place in a transverse plane; one

of the forks is Laurer's canal, the other should be regarded as the continuation of the oviduct. The latter curves slightly cephalo-ventrad to penetrate the shell gland. Laurer's canal curves around the right latero-dorsal aspect of the shell gland to gain a position dorsad of the latter, then it passes cephalo-dorsad close to the left of the excretory vesicle and opens on the dorsum a little to the left of the median line at a point in a transverse plane slightly caudad of that of the cephalic aspect of the ovary and about 1.72 mm. (or about one-fifth of the total body length) caudad of the excretory pore. The shell gland is considerably smaller than the ovary and lies a little to the left of it and of the median sagittal plane.

On its mesio-caudal aspect the shell gland is penetrated by the oviduct and on its caudal aspect near its mesial margin by the

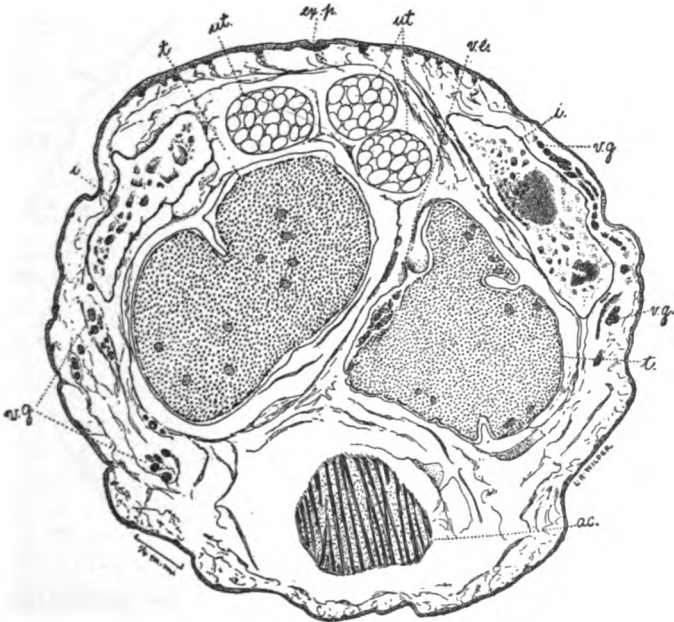


FIG. 111.

vitello-duct. These ducts unite almost at once to form the ootype. This fusiform canal pierces the shell gland obliquely cephalad and to the left, emerging from the left latero-cephalic aspect of the gland as the uterus. The uterus after emerging from the shell gland tends cephalad, curving around the dorsal aspect of the shell gland to gain the axial region of the worm. Here the uterus in its ascent cephalad describes intricate coils. It forms some loops in the space between the caudal portion of the left testis and the acetabulum, then doubles back passing underneath this testis somewhat obliquely to the left and turns cephalad in the space dorsad of this testis. It ascends in

this position in an almost straight course for a considerable distance before it again begins to form coils. These coils are in the intercecal space dorsad of the testes and at first ventrad of the excretory vesicle and duct, and later between the testes and dorsum. The coils are distended with very numerous oval, operculated eggs. As the level of the cephalic aspect of the right testis is approached, the coils tend cephalo-ventrad between the vasa efferentia and gradually gain the ventral aspect of the coiled vesicula, ascending cephalad in this relation for a short distance, after which the windings cease and the eggs disappear from its lumen. It now ascends in only a slightly wavy course close to the ventral aspect of the vas deferens to unite

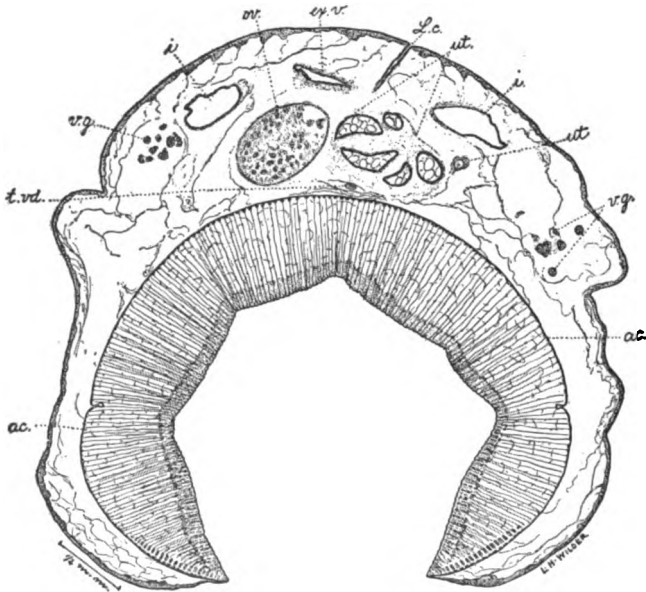


FIG. 112.

with the ductus ejaculatorius at the base of the genital papilla in the manner already described.

The vitellogene glands resemble those of *P. cervi*, but are not quite so highly developed. The follicles are large and prominent and occupy the extracecal areas, but extend along underneath the lateral margins toward both the ventral and dorsal median sagittal line, approaching closer, however, to the latter than to the former, and coming into relation with both ventral and dorsal aspects of the ceca. Vertically the glands extend from slightly above the level of the base of the sucker to about the level of the plane of the caudal margin of the shell gland. It will be observed, therefore, that in length they exceed that of the intestinal ceca; that is, they extend beyond the limits of the cecal zone.

A transverse vitello-duct leaves the caudal portion of each gland, passes obliquely caudo-mediad ventrally of the corresponding intestine to unite close to the dome of the acetabulum at a point in a transverse plane just above that of the cephalic aspect of the shell gland. Their union results in the formation of a common duct which passes caudo-dorsad, skirting the ventral and ventro-caudal aspect of the shell gland, finally to penetrate the latter at its caudal aspect as already described.

Eggs.—The eggs are operculated and very numerous. One of the eggs measured in section of the uterus was 120μ long by 67.5μ broad.

EXCRETORY SYSTEM.—The excretory vesicle is relatively small, being a rather long, and dorso-ventrally very narrow, almost slit-like

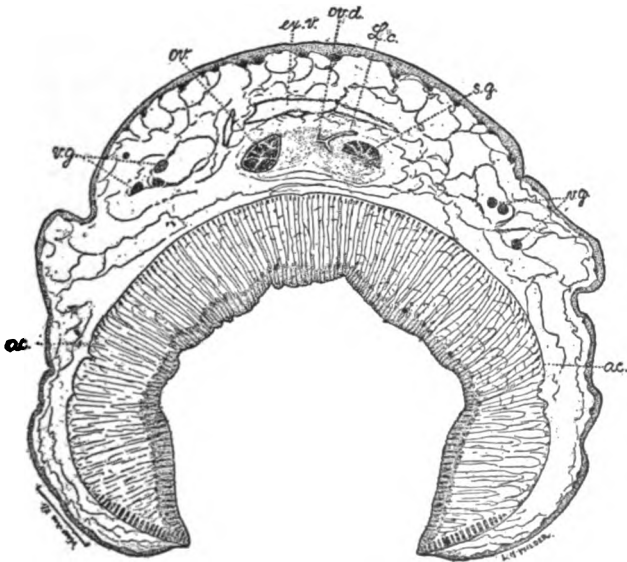


FIG. 113.

space. Its dome is in the caudal portion of the body about midway between the acetabulum and dorsum and about 1.48 mm. (or about one-sixth of the body length) from the caudal margin of the worm. From the dome the body of the vesicle extends cephalad, gradually coming nearer the dorsum as it ascends in the intercecal area. As it ascends also it gradually narrows in both transverse and dorso-ventral diameters until it becomes reduced to a cylindrical duct about 52μ in diameter and 240μ long, with thickened walls, which opens on the dorsum at about the level of the superior margin of the acetabulum, namely, about five-ninths of the total body length caudad of the oral margin, and, as already stated, about one-fifth the body length cephalad of the opening of Laurer's canal.

RELATION TO *P. explanatum* AS DESCRIBED BY FISCHÆDER.

Comparing our specimens with *P. explanatum*, as described by Fischæder, 1904, 454-458, figs. A, 1-3, the following differences are noticed: In *explanatum* the genital pore is immediately postbifurcal instead of suctorial; the ceca end at the cephalic margin of the acetabular aperture, instead of at the acetabular equator; excretory pore is equatorial, some distance cephalad of acetabulum, instead of on preacetabular plane; the excretory vesicle ends cephalad of acetabular equator instead of at its equator; the testes are distinctly farther cephalad, the anterior testis not reaching the acetabulum; the pars prostatica is longer instead of shorter than the pars muscosa; the ovary is at the anterior margin, instead of at the equator of acetabulum, and is distinctly and entirely in the intercecal area instead of at and caudad of end of ceca; Laurer's canal is distinctly preacetabular instead of at the equator of the acetabulum.

These differences would appear to indicate that we are dealing either with a distinct species, or a distinct subspecies, or with a rather marked case of individual variation; they are certainly more marked than the characters now being used to distinguish between some species of distomes. As it is easier to suppress a synonym than it is to disentangle anatomical and biological data of separate forms confused in one alleged species, we incline to the view (contrary to most authors) that in case of doubt the more conservative action consists in proposing a new species, hence we publish this form as such.

ILLUSTRATIONS.

FIG. 103.—Profile view. Enlarged. Original.

FIG. 104.—Ventral view of same. Enlarged. Original.

FIG. 105.—Profile projection of specimen shown in figs. 103 and 104. Shows oral sucker (*o. s.*), esophagus (*es.*), right intestinal cecum (*i.*), genital pore (*g. p.*), ductus hermaphroditicus (*d. h.*), pars prostatica (*p. p.*), pars muscosa (*p. m.*), vesicula seminalis (*v. s.*), right vas efferens (*v. e.*), right (*t. d.*) and left (*t. s.*) testis, ovary (*ov.*), shell gland (*s. g.*), uterus (*ut.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*); excretory pore (*ex. p.*), and acetabulum (*ac.*); *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 106.—Frontal projection of specimen shown in figs. 103 and 104. Shows oral sucker (*o. s.*), esophagus (*es.*), intestinal ceca (*i.*), ovary (*ov.*), shell gland (*s. g.*), uterus (*ut.*), the right (*t. d.*) and left (*t. s.*) testis; the vasa efferentia (*v. e.*), vesicula seminalis (*v. s.*), and pars muscosa (*p. m.*), position of genital pore (*g. p.*), and the acetabulum (*ac.*); *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 107.—Transverse section at *a-a*, figs. 105 and 106. Shows form of body, form of oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), and dorsal and ventral mesenterium-like strands (*m. b.*). Enlarged. Original.

FIG. 108.—Transverse section at *b-b*, figs. 105 and 106. Shows genital atrium (*g. a.*), genital papilla (*g. pap.*), oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), and some vitelline follicles (*v. g.*). Enlarged. Original.

FIG. 109.—Transverse section at *c-c*, figs. 105 and 106. Shows pars muscosa (*p. m.*), uterus (*ut.*), esophagus (*es.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 110.—Transverse section at *d-d*, figs. 105 and 106. Shows position and relations of uterus (*ut.*), vesicula seminalis (*v. s.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 111.—Transverse section at *e-e*, figs. 105 and 106. Shows position and relations of the testes (*t.*), left vas efferens (*v. e.*), uterus (*ut.*), intestines (*i.*), superior margin of acetabulum (*ac.*), the excretory pore (*ex. p.*), and the vitellaria (*v. g.*). Enlarged. Original.

FIG. 112.—Transverse section at *f-f*, figs. 105 and 106. Shows positions and relations of ovary (*ov.*), uterus (*ut.*), excretory vesicle (*ex. v.*), Laurer's canal (*L. c.*), intestines (*i.*), vitellaria (*v. g.*), right transverse vitello-duct (*t. vd.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 113.—Transverse section at *g-g*, figs. 105 and 106. Shows origin of Laurer's canal (*L. c.*) from oviduct (*ov. d.*), the ovary (*ov.*), shell gland (*s. g.*), excretory vesicle (*ex. v.*), vitellaria (*v. g.*), and acetabulum (*ac.*). Enlarged. Original.

PARAMPHISTOMUM PARVIPAPILLATUM, new species.

[Figs. 114 to 122.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73); Body 3.1 to 3.9 mm. long by 1.8 to 2.3 mm. broad; buff color (alcohol specimens); rather oval, longitudinal outlines of lateral margins nearly straight; tapers very gradually; cephalic extremity slightly less bluntly rounded than caudal extremity; surface smooth. Genital pore post-bifurcal, about one-fourth of body length from oral margin. Acetabulum subterminal, aperture about 0.5 to 0.6 mm. in diameter. Mouth terminal to ventro-subterminal (distortion?); oral sucker rather pyriform to oval; esophagus bulbous, short (?), about as long (?) as sucker, bifurcation about midway between oral margin and genital pore; ceca wavy, long, extending to or slightly caudal of equator of acetabulum. Excretory pore dorso-median, a little caudad of pore of Laurer's canal, dorsal of equator of acetabulum and not crossed by Laurer's canal; excretory vesicle dorsal of acetabulum.

Male organs: Testes occupy greater part of median field from equator to acetabulum; one caudad of the other; of irregular outline (in part artifact?); vasa efferentia unite in vas deferens; vesicula seminalis convoluted; pars muscosa short; pars prostatica short, but well developed; ductus ejaculatorius exceedingly short, unites with metratrem to form ductus hermaphroditicus, which opens on vertex of genital papilla; the latter is surrounded by an atrium into which projects a circular ridge bearing numerous

exceedingly minute papillæ which also extend over on to the genital papilla; cirrus pouch absent.

Female organs. Ovary median but extending more to the left than to the right, near dorsum, immediately caudad of caudal testis and on a plane of upper margin of acetabulum; shell gland on ventro-caudal aspect of ovary; vitellaria highly developed, close to lateral margins, lateral, dorsal, and ventral of ceca, extend about from base of sucker to or slightly beyond equator of acetabulum; uterus passes from ventrally of shell gland and ovary, dorsad between ovary and caudal testis, cephalad dorsally of testes, ventrad under arch of vasa efferentia, cephalad to ductus hermaphroditicus; it is coiled, and filled with a fairly large number of eggs; Laurer's canal passes from oviduct dorso-medio-cephalad and opens in median line.

Eggs. Numerous, oval, about 135 by 67 μ .

TYPE.—U.S.P.H. & M.-H.S. 9962.

HABITAT.—Reticulum of "calf" (*Bos indicus* var.) at Phrapatoom, Siam.

SOURCE OF MATERIAL.—This material was sent to us by Dr. Paul G. Woolley, who collected it in Phrapatoom, Siam, on September 22, 1906, from the reticulum of a calf (*Bos indicus* var.).

EXTERNAL CHARACTERS.

SIZE.—The specimens vary from 3.1 mm. to 3.9 mm. in length and from 1.8 to 2.3 mm. in maximum breadth.

COLOR.—Alcohol specimens are of a buff color.

FORM.—In the process of fixing and in the course of preservation the specimens appear to have undergone considerable distortion, so that from the material at hand it is difficult to more than suggest very roughly their original form (fig. 114). They are oval in outline, with lateral margins approximately parallel in the equatorial region and with extremities that are bluntly rounded. The dorsal (and perhaps also the ventral) surface is probably arched in the fresh state, but in our specimens they are marked by ridges and depressions due probably to the shrinking influence of the fixing and hardening solutions.

SURFACE.—The general surface is smooth, except for an indication of transverse wrinkles or striations. No surface papillæ are evident. The cephalic extremity is marked by the presence of a more or less circular oral aperture, and the caudal by the presence on its ventral aspect of a large subterminal acetabulum, distorted in form in most of the specimens in such a manner as to make its aperture longitudinally elliptical in outline, though one or two retained what is probably their normal circular form.

Genital pore.—The genital pore is ventro-median (figs. 114, 115, 119, 120) on a somewhat flattened rounded elevation or bulging about one-fourth the body length from the cephalic end and caudad of the bifurcation of the esophagus.

Acetabulum.—The acetabulum is distinctly subterminal in all specimens. It varies considerably in respect to form, position, and aperture, these variations being largely due, in all probability, to the

distorted condition of the body. Two specimens presented circular apertures 0.5 to 0.6 mm. in diameter; four specimens presented more or less elliptical apertures, varying from 0.6 to 0.7 mm. in longitudinal and 0.17 to 0.4 mm. in transverse diameter. The rim of the acetabulum appears to project beyond the body parenchyma in a manner very like that in *Pseudodiscus collinsii*, and there is a strong suggestion of a ring around the aperture similar to that which occurs in *Ps. stanleyii* and *Ps. collinsii*. As a matter of fact, however, the apparently projecting ring is covered by a thin layer of parenchyma. The deep narrow groove which marks off this ring in *Ps. stanleyii* and *Ps. collinsii*, while strongly suggested, is not so clearly recognizable in this species (figs. 116, 122). The dome of the acetabulum measures about 126μ to 135μ in thickness.

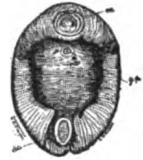


FIG. 114.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The more or less circular oral aperture gives entrance directly into a somewhat pyriform muscular oral sucker (fig. 116). In transverse section (fig. 117) the latter is elliptical in form, with its major axis in the transverse diameter of the body. Its lumen is a dorso-ventrally more or less narrow, transversely fairly broad space.

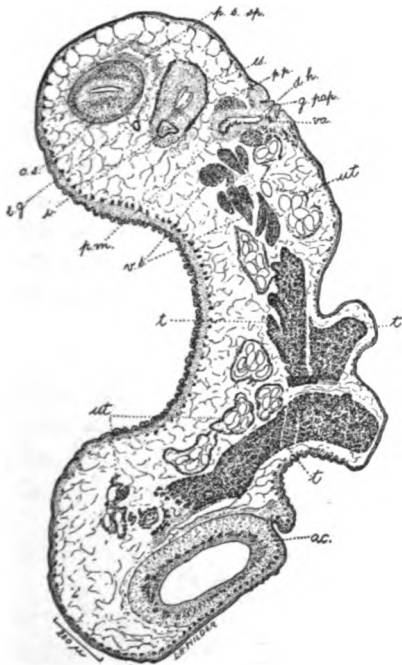


FIG. 115.

It is lined by a thin cuticle-like layer which appears to have disappeared from some portions of the lumen, and bears some conical papillæ of moderate size on its surface. The sucker lies in a perisuctorial space (figs. 116, 117) suggestive of a rudimentary body cavity. Dorsally of its esophageal extremity there is a transverse ganglionic cord (fig. 115). The sucker is succeeded by the esophagus. From our preparations it is impossible to determine satisfactorily its length; it is estimated, however, that it is not shorter than

the sucker. It passes at first for a short distance caudad, then bends abruptly and passes almost directly dorsad, but with an inclination caudad (fig. 118), terminates, and gives origin laterally to the intestinal ceca.

a well-developed thin-walled vesicula, which is very much coiled; a short but well-developed pars muscosa; a short but very well-defined prostatica; and a terminal excessively short ductus ejaculatorius. The latter unites with the metraterm to form a ductus hermaphroditicus. The ductus hermaphroditicus pierces the axial region of a well-developed truncated conical genital papilla. The genital papilla (figs. 115, 119, 120) projects into an atrium, which it almost fills. Embracing the genital papilla is a ring-like collar, the surface of which is beset by excessively minute papillæ (hence *parvipapillatum*), which also extend to some extent over the base of the genital papilla. External to the ring-like collar and marked off from it by a groove is another ring. This latter ring almost disappears in some positions of extrusion of the copulatory apparatus, forming a shallow crater, in the center of which is the genital pore.

Female organs.—The ovary lies in the median line (fig. 121), close under the dorsum just caudad of the posterior testis, and at the level of the upper margin of the acetabulum. It appears somewhat elongated in the transverse diameter and compressed dorso-ventrally, hence somewhat pyriform, and extends somewhat more to the left than to the right of the median line. The point of origin of the oviduct was from the right extremity in one preparation and from the left in another; from its point of origin the oviduct passes to the opposing aspect of the shell gland. The latter lies close to the ventral aspect and lower margin of the ovary. The relation of the shell gland to the ovary varies somewhat in the different specimens studied. It is penetrated by the oviduct, which is then joined by the vitello-duct, after which the duct thus formed dilates somewhat to form the ootype; the latter is continued and emerges from the shell gland as the uterus. After emerging, the uterus passes at first caudad for a short distance, then turns, forms a loop, and passes cephalad in front of the shell gland and ovary, dorsad between the posterior testis and ovary, then cephalad between the testes and dorsum of the worm. In its progress it forms coils which are distended with eggs. At the level of the cephalic aspect of the anterior testis it takes a course ventrad beneath the arch of union of the vasa efferentia and penetrates the base of the genital papilla in company

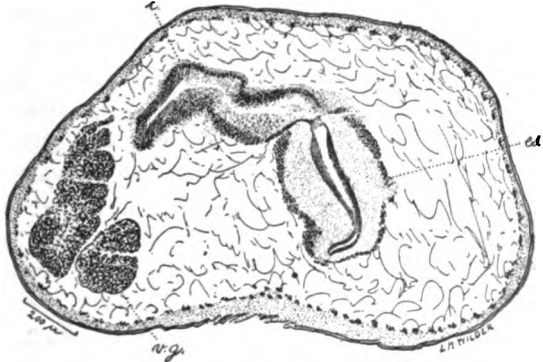


FIG. 118.

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with the terminal portion of the vas deferens, with which it opens into the ductus hermaphroditicus.

The yolk glands are highly developed. They consist of numerous closely aggregated follicles in the lateral portion of the body close to the lateral margins. They inclose dorsally, ventrally, and laterally the corresponding intestinal cecum. The gland of the left side extends somewhat farther toward the median line than that of the right side, so that it comes into relation with the dorsal and the ventral aspects of the left ends of both testes. The glands extend, longi-



FIG. 119.

tudinally, from the termination of the sucker to about the equator of the acetabulum (or slightly caudad of the level of termination of the intestinal ceca). A little above the level of the caudal termination of the yolk glands the duct of either side is given off and passes toward the middle line, ventrally of the corresponding intestinal tube, to unite with the duct of the opposite side; by the union of these a duct is formed which passes dorsad toward the shell gland, which it penetrates on its caudal aspect to join the oviduct.

Laurer's canal leaves the oviduct about where the latter is on the point of penetrating the shell gland and passes dorso-mediad and very

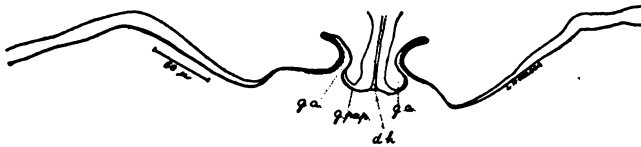


FIG. 120.

slightly cephalad to open on the dorsal surface about in the median line (fig. 122).

Eggs.—The eggs are numerous, oval in form, and as seen in the uterus they measure about 135μ by about 67μ .

EXCRETORY SYSTEM.—The excretory vesicle lies in the caudal portion of the body behind (dorsad of) the acetabulum. In the specimens studied it appears collapsed. From its caudo-dorsal aspect a short thick-walled duct passes dorsad to discharge through the excretory pore in the median line in a plane a little caudad of the opening of Laurer's canal and near the caudal extremity of the body. It is not crossed by Laurer's canal.

ILLUSTRATIONS.

FIG. 114.—Ventral aspect: *ac.*, acetabulum; *g. p.*, genital pore; *m*, mouth. Enlarged. Original.

FIG. 115.—Sagittal section. Shows portion of oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*) containing granular coagulum, caudal

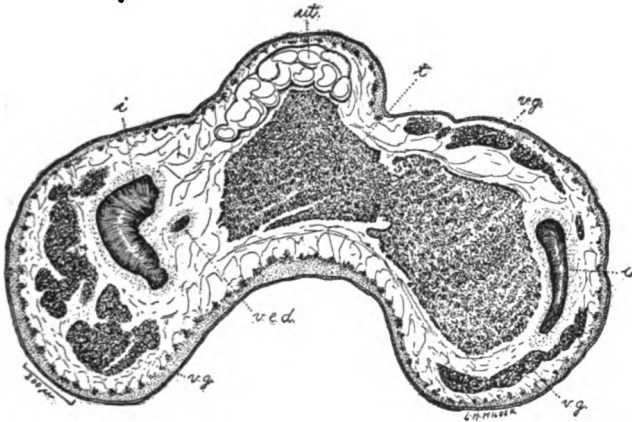


FIG. 121.

portion of esophagus (*es.*), left intestinal cecum (*i.*), esophageal ganglion (*e. g.*), genital papilla (*g. pap.*), ductus hermaphroditicus (*d. h.*), pars prostatica (*p. p.*), vesicula seminalis (*v. s.*) distended

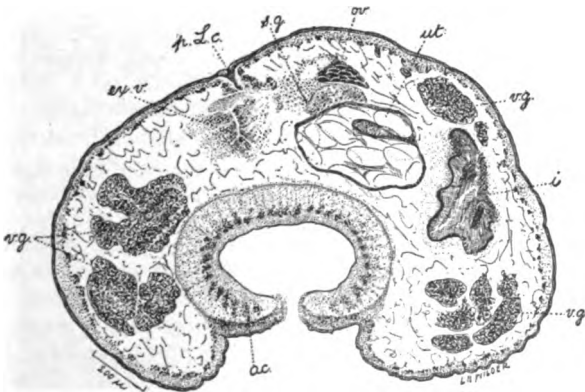


FIG. 122.

with spermatozoa, metraterm (*va.*), uterus (*ut.*) distended with eggs, testes (*t.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 116.—Sagittal section. Shows oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*) with granular coagulum, left intestinal cecum (*i.*), the two testes (*t.*), left vas efferens (*v. e. s.*), uterus (*ut.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 117.—Transverse section. Shows oral sucker (*o. s.*) and perisuctorial space (*p. s. sp.*) filled with a granular coagulum. Enlarged. Original.

FIG. 118.—Transverse section. Shows bulbous portion of esophagus (*es.*), right intestine (*i.*), vitellogene gland (*v. g.*). Enlarged. Original.

FIG. 119.—Transverse section of copulatory apparatus. Shows genital papilla (*g. pap.*), ductus hermaphroditicus (*d. h.*), genital atrium (*g. a.*), and minute papillæ on ring-like collar and base of genital papilla. Enlarged. Original.

FIG. 120.—Transverse section through copulatory apparatus to contrast with figure 119. Shows form of genital papilla (*g. pap.*) encircling papillated ring, slit-like dorsal chamber (*g. a.*), (*d. h.*) and shallow crater-like depression (ventral chamber) at vertex of genital bulging due to retraction of outer ring. Enlarged. Original.

FIG. 121.—Transverse section. Shows superior testis (*t.*), right vas efferens (*v. e. d.*), intestines (*i.*), and vitellaria (*v. g.*) and uterus (*ut.*) filled with eggs. Enlarged. Original.

FIG. 122.—Transverse section at level of pore of Laurer's canal. Shows pore of Laurer's canal (*p. L. c.*), caudal margin of ovary (*ov.*), caudal margin of shell gland (*s. g.*), uterus (*ut.*), excretory vesicle (*ex. v.*), left intestinal cecum (*i.*), vitellaria (*v. g.*) and acetabulum (*ac.*) with an apparent though not actual projecting rim. Enlarged. Original.

PARAMPHISTOMUM SHIPLEYI, new species.

[Figs. 123 to 130.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body apparently somewhere between 4.5 and 7 mm. long by 2.46 mm. broad by 2.26 mm. thick; color (?); greatest breadth about at junction of equatorial and caudal thirds; tapers toward bluntly pointed oral pole, diameters at genital pore 2 mm. (transverse) and 1.98 mm (dorso-ventral). Surface with minute papillæ on oral pole. Genital pore ventro-median, about 75 μ in diameter, about at junction of cephalic and equatorial thirds, very slightly postesophageal and postbifurcal, in cecal zone; at this point there is an ill-defined slightly bulging area. Acetabulum ventrosubterminal; very slightly sunken below surface, 1.15 mm. in transverse, 1.95 mm. (?) in dorso-ventral diameter, aperture about 0.39 mm. Mouth nearly terminal, with ventrosubterminal tendency, in papillated depression; oral sucker rather large, pyriform, but somewhat flattened dorso-ventrally, its oral pole projecting slightly, its lumen papillate; lies in a well defined pseudobody-cavity; esophagus acutely bent, convexity ventrad, caudal half with greatly thickened muscular wall; ceca of very irregular diameter, wavy, extend about to equator of acetabulum. Excretory pore dorso-median, caudad of Laurer's canal, somewhat caudad of equator of acetabulum; thick walled excretory canal runs from pore slightly caudo-ventrad to dorso-caudal aspect of well-developed excretory vesicle, which lies dorsad of acetabulum, extending from near anterior plane of acetabulum to caudal acetabular plane.

Male organs.—Testes large, lobate, one ventro-caudad of the other, fields nearly coincide, zones overlap, nearer venter than dorsum; vasa efferentia run cephalad at side of testes, their point of union is undetermined; vas deferens composed of: (1) coiled vesicula seminalis, which lies dorsally of (2) a pars intermedia and (3) the

highly developed coiled pars muscosa, (4) pars prostatica straight, relatively short, but well developed, and separated from muscosa by a sphincter-like constriction; (5) thick walled ductus ejaculatorius; the latter opens into a slit-like space into which metraterm also discharges; from here a short duct passes ventrad to another slit-like atrium; from the latter a duct passes ventrad to open into a small atrium which opens to the exterior through the genital pore; this series of atria and canals is inclosed in a mesh of muscular fibers.

Female organs.—Ovary and shell gland dorso-caudal of and very much smaller than caudal testis, dorsal of cephalic portion of acetabulum, slightly dextral of median line; shell gland ventro-lateral of ovary; vitellaria with well developed, not numerous follicles, in extracecal areas, extend from slightly preesophageal zone to caudal end of cecal zone; uterus extends slightly caudad then cephalad, dorsally of testes, ventrally of the greater mass of pars muscosa, to open into same slit as does ductus ejaculatorius.

Eggs.—Oval, 135 by 71 μ , operculated at smaller pole.

TYPE.—U.S.P.H. & M.H.S. No. 10717 (returned to Shipley).

HABITAT.—In (? stomach of) *Cervus eldi*, locality (?).

SOURCE OF MATERIAL.—The material, consisting of a series of transverse sections of one specimen, was loaned to us by Dr. A. E. Shipley. *Host*.—*Cervus eldi* (?), stomach.

EXTERNAL CHARACTERS.

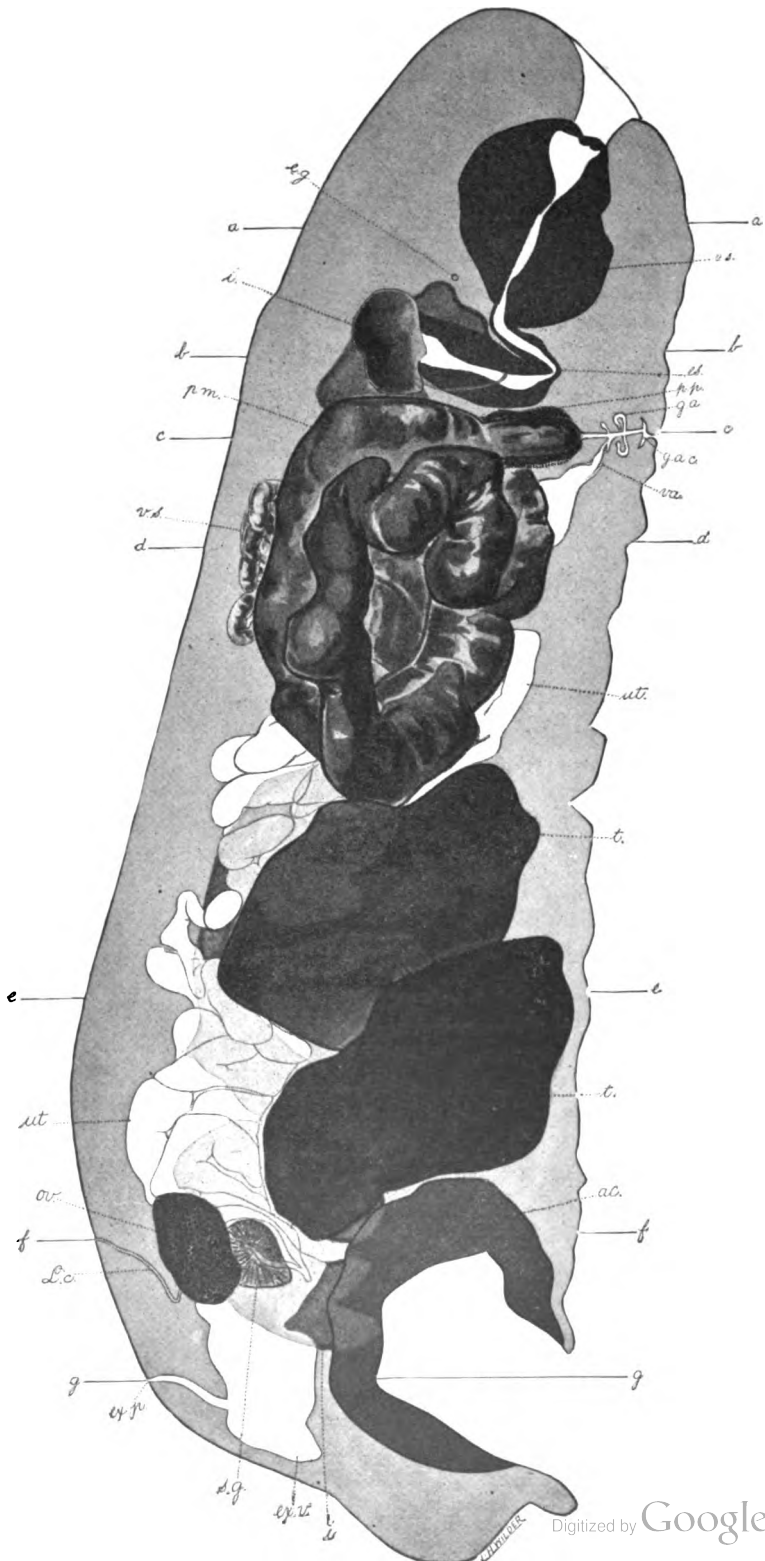
SIZE.—The specimen came to us already sectioned. We do not know the thickness of the individual sections, so can not do more than roughly estimate the length of the worm. It is probably not less than 4.5 mm. nor more than 7 mm. long, with a maximum dorso-ventral diameter of about 2.26 mm. and a maximum transverse diameter about 2.46 mm. as measured in sections.

FORM.—The worm is broadest and thickest in the regions of junction of the middle with the caudal thirds of the body length. From this region the body tapers toward the oral pole, which is bluntly pointed and at about the level of the genital pore, measures about 2 mm. in width and about 1.98 mm. in dorso-ventral diameter.

SURFACE.—The surface cuticle is unprovided with hooks or spines, but minute papillæ could be made out at the oral pole.

Genital pore.—In the ventro-median line, about at the junction of the first with the middle third of the body length, is a small orifice about 75 μ in transverse diameter, the genital pore. This is in the center of a circular, ill-defined, slightly bulging area.

Acetabulum.—The acetabulum is in the caudal portion of the body with, probably, a terminal (or subterminal) aperture, though this is shown as ventro-subterminal in the diagram (fig. 123). At the level of the excretory pore the acetabulum measures about 1.15 mm. in transverse diameter with an aperture of about 0.39 mm. in the same diameter. The rim of the acetabulum, although it does not project beyond the embrace of the body parenchyma, is covered only by a relatively thin layer of it for a distance of about 255 μ (fig. 130) from



the margin of the aperture. Judging from the appearance of this in section, the unsectioned specimen probably presents corresponding to it a collar-like area immediately around the acetabular aperture delimited from the general surface by a shallow, more or less well-defined groove, somewhat like but not so well defined as that in *P. siamense*.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The mouth is at the bottom of a circumscribed depressed area at the vertex of the cephalic extremity. It is an irregular orifice which leads directly into the lumen of a well-developed sucker. The crater-like depression of the surface is beset with digitate papillæ. In form the sucker is pyriform though somewhat flattened dorso-ventrally. Its caudal pole is broad and rounded and gives origin to the esophagus; its oral pole projects in an irregular ring-like manner beyond the parenchyma and its aperture is the mouth. The sucker is placed in a well-marked perisuctorial space (fig. 124), which is traversed dorsally and ventrally by mesenterium-like

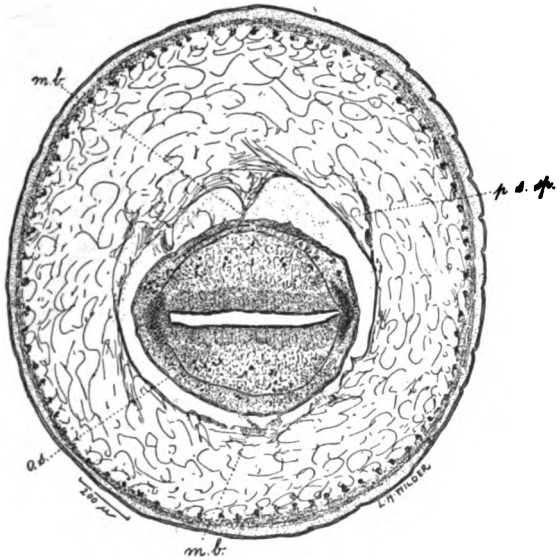


FIG. 124.

strands. The suctorial wall may be regarded as consisting of a ventral and of a dorsal muscular plate, the two, however, being continuous laterally. The muscular fibers form a dense inner and a looser meshed and relatively thicker outer zone, as seen in transverse section. The lumen is a dorso-ventrally narrow, transversely broad space which caudally becomes reduced to a small circular aperture leading into the esophagus. It is lined by a thin cuticle which is beset by small hemispherical to conical papillæ. These are more numerous and larger near the oral pole. Close to the dorso-caudal aspect of the sucker, slightly above the level of the origin of the esophagus and just without the perisuctorial space, there is a well-defined transverse nerve trunk (fig. 123) which gives off branches cephalad and caudad; these, however, can not be traced satisfactorily.

The esophagus passes at first ventro-caudad for approximately half its length, then, bending acutely, it turns dorsad, with a slight tilt cephalad, to fork into the lateral ceca at a point in a transverse plane slightly caudad of that of the base of the sucker and a little cephalad of that of the genital pore, and about or slightly more than one-third of the dorso-ventral diameter of the worm at that level from the dorsum. The muscular wall of this second portion of the esophagus is very greatly increased in thickness; the increase begins at about the point where the esophagus bends, and it augments progressively almost but apparently not quite to its caudal end. The esophageal lumen is lined by a fairly thick cuticle-like layer.

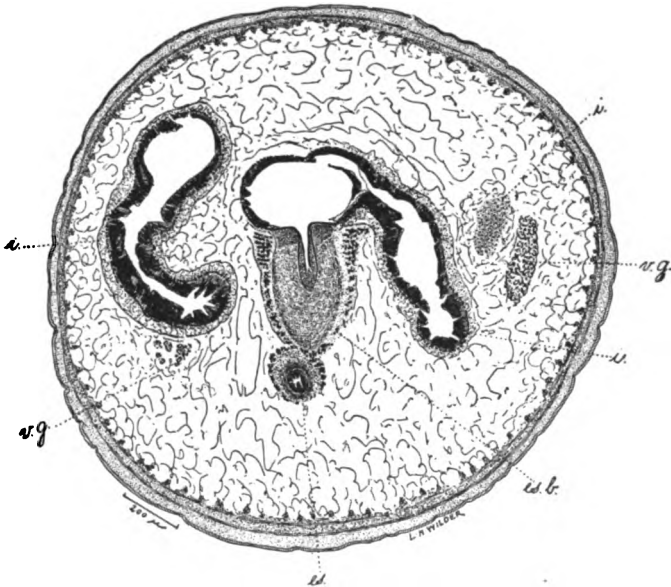


FIG. 125.

The intestinal ceca pass at first for a short distance laterad, then curve ventro-laterad, at the same time tilting caudad until they reach a point in a frontal plane somewhat dorsad of that of the bend or knee of the esophagus. Here each intestine rather abruptly curves dorsad and proceeds in this spirally, wavy course caudad until it reaches about the level of the cephalic margin of the acetabular aperture, where each intestine terminates by a cecal extremity.

The diameter of the gut varies at different points in its course, there being marked dilatations (fig. 126) succeeded by equally marked constrictions (fig. 127). The lumen of the ceca is lined by an epithelial cell layer.

GENITAL SYSTEM.—The sexual organs, with the exception of the vitellogene glands, are disposed in the intercecal area.

Male organs.—There are two large lobate testes, one of which is caudad of the other; the cephalic portion of the caudally placed testis overlaps the right ventro-lateral aspect of the caudal portion of the cephalically placed testis. They are nearer the venter than the dorsum in a zone which exceeds somewhat in vertical diameter one-fourth the body length, in other words, comprising the third and to some extent the fourth quarter of the body. Each testis gives origin to a vas efferens, that of the caudal testis passes to the left and that of the cephalic to the right, and then each proceeds cephalad. The left vas efferens (from the caudal testis) ascends at first close to the left lateral aspect of the cephalic testis (between it and the intestine) and later,

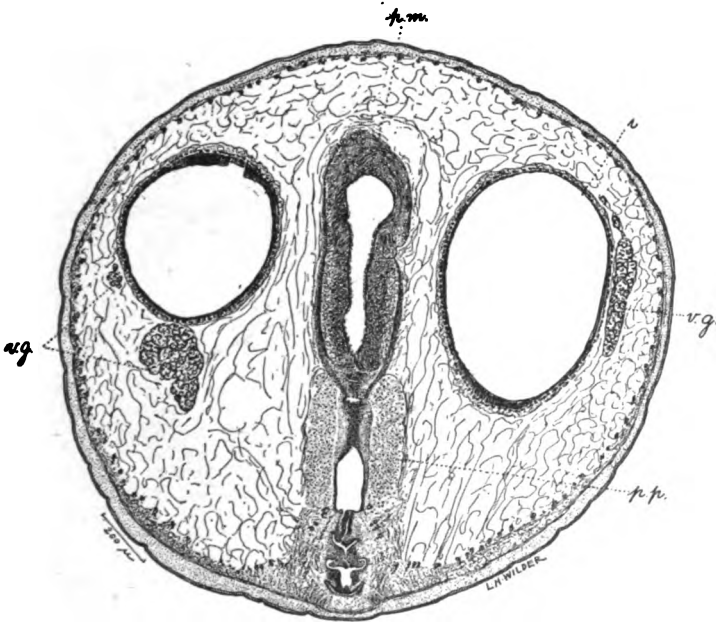


FIG. 126.

as it tends dorso-cephalad, it skirts the left lateral aspect of the coiled pars musculosa, eventually entering the coil complex of the vesicula, which is presumably formed by its union with the right vas; but this point can not be satisfactorily traced in the complexity of the coils. The course of the right vas (from the superior testis) is similar to that of the left, but is of course much shorter, and almost at once after its origin it begins to skirt the left lateral aspect of the coiled pars musculosa, eventually entering and becoming indistinguishable among the coils of the vesicula. The vesicula forms an easily distinguishable thin-walled coil complex placed close to the dorsal aspect of the coil formed by the pars musculosa. The latter is the second portion of the vas deferens, but there is intercalated, between the vesicula and

the musculosa, a short, relatively thick-walled narrow duct, which has been noted in some of the other forms and named the pars intermedia. The pars musculosa (fig. 127) is highly developed, thick, muscular walled, and very much coiled; measurements at favorable points give a diameter of about 225μ to 300μ , with a thickness of wall of about 45μ to 60μ . The caliber of the lumen of this part of the vas deferens considerably exceeds that of the vesicula. The musculosa is succeeded by a relatively short (420μ) but well-developed prostatica, a sphincter-like constriction marking the transition from one to the other. The prostatic cells are well developed and form a thick, encircling layer about the duct, the diameter of which is decidedly reduced

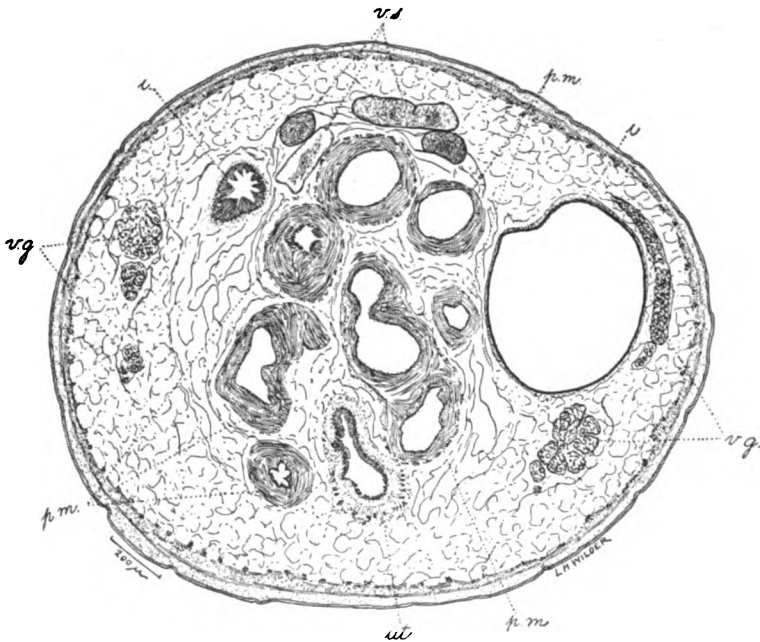


FIG. 127.

as compared with that of the musculosa, and its wall is much thinner than that of the latter. The pars prostatica is straight and passes almost directly ventrad. In its turn the prostatica is succeeded by a thick-walled duct about 75μ in diameter and about 120μ long; this may perhaps be regarded as the ductus ejaculatorius. The ductus ejaculatorius is directed ventrad and opens with, but separate from, and just above the uterus, into a small narrow slit-like space. From this space a short duct passes ventrad and may be regarded as piercing the axial region of a mushroom-like structure (figs. 123; 126) to open into another slit-like atrium somewhat larger, however, than the one into which the male and female ducts open. A duct about 30μ in diameter leads from this atrium and apparently pierces a stout conical

papilla, which may be regarded as the genital papilla, to open into a small genital atrium which connects with the exterior by the genital pore. The series of atria and ducts connecting them, between the termination of the ductus ejaculatorius and the genital pore, which may be regarded as forming the hermaphroditic copulatory apparatus, is inclosed in a cylindrical mesh of muscular fibers, which do not, however, form such a well-defined structure as is described, for example, in *Watsonius watsoni* or *Paramphist. crassum*.

Female organs.—The ovary and the shell gland, the latter close to the right ventro-lateral aspect of the former, are in the caudal portion of the intercecal space, caudo-dorsad of the caudal testis, dorsad of the cephalic portion of the acetabulum, and immediately to the right of

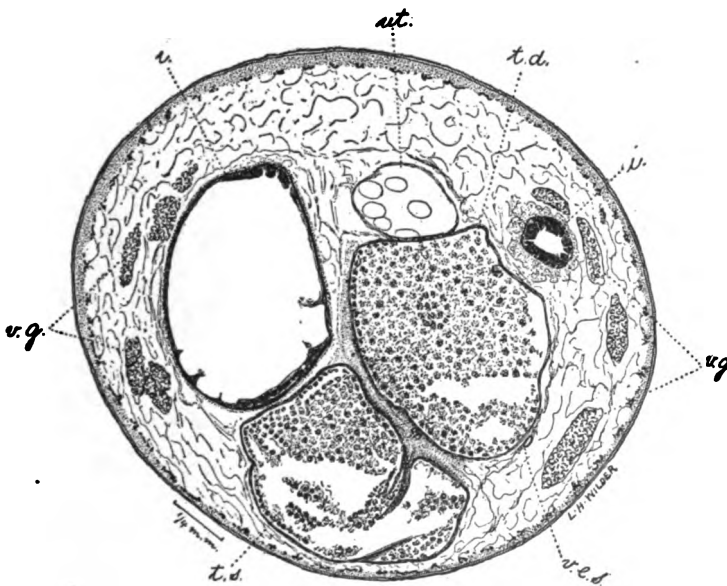


FIG. 128.

the median sagittal plane and the dome of the excretory vesicle. The ovary is the larger of the two glands. The oviduct takes origin from the left lateral aspect of the ovary, and at first, for a short distance, passes to the left, then again, for a short distance, it curves cephalad and to the right, after which it proceeds obliquely ventrad and to the right with a very slight tilt cephalad toward the shell gland, at the same time giving origin to Laurer's canal. This occurs in about the same transverse plane as the one in which the uterus is seen to emerge from the shell gland. The oviduct penetrates the left pole of the shell gland, in the substance of which it is joined by the common vitello-duct, the two uniting to form the ootype. The latter is directed obliquely to the right and ventro-caudad and is continued as the uterus. Laurer's canal, after parting from the oviduct, passes at

first directly caudad then with a tilt to the left and dorsad to a point slightly caudad of the level of origin of the oviduct, where it bends and passes cephalo-dorsad to open on the dorsum in about the median sagittal line at a point in a transverse plane slightly caudad of those of the cephalic margins of the ovary and the acetabulum and in about the plane of the caudal margin of the caudal testis (fig. 129).

The shell gland lies close to the right ventro-lateral aspect of the ovary; its major axis is directed obliquely from the left to the right and ventro-caudad. As already stated, it is penetrated at the left pole by the oviduct; at its left latero-cephalic aspect, it is penetrated by the common vitello-duct, the two uniting in the ootype. The uterus, which is the continuation of the ootype, emerges from the right pole

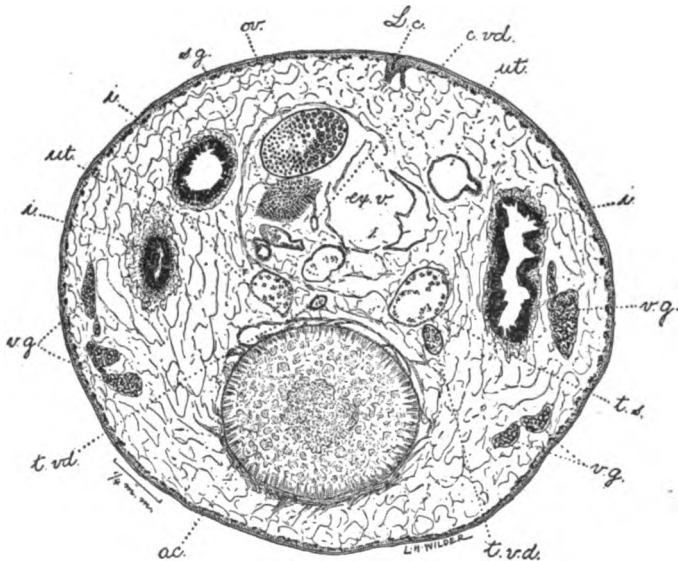


FIG. 129.

of the gland and turns to the left and cephalad. It forms some coils ventrally and to the left of the shell gland and ovary, then skirts the right and dorsal aspects of the dome of the excretory vesicle to reach the left dorso-lateral aspect of the dome of this vesicle. Here, in the area between the vesicle and the left intestine, it dips caudad for a short distance, then doubles sharply cephalad to begin its ascent. It forms winding ascending coils in the intercecal space between the dorsum and the testicles. At the level of the cephalic margin of the superior (cephalic) testicle, the uterus passes ventrad, skirting the caudal aspect of the coiled vas deferens, after having first, however, ascended a short distance between this coil and the dorsum. On reaching the ventral aspect of the coil, it ascends in close relation to it and with only slight and few windings which eventually cease altogether. It finally comes in close relation to the caudal aspect of the

ejaculatory duct, opening, as has already been stated, immediately caudad of the latter into a small slit-like chamber. The first portion of the uterus contains a considerable number of yolk cells; the coils which are between the testicles and the dorsum are distended to a variable degree with eggs, among which in the more proximal coils may also be seen some clumps of spermatozoa. The eggs are oval in form with a small operculum at the more pointed end and measure about 135μ by 71μ .

The vitellogene glands, consisting of well-developed but not numerous follicles, are disposed in the extra-cecal areas (between the intestine and lateral body wall), extending vertically from a little cephalad of the level of the esophageal fork—slightly cephalad of the base of the oral sucker to or very slightly caudad of the level of the cecal ends of the gut. At about the level of the cephalic margin of the acetabulum a duct leaves each gland and passes obliquely inward and caudad, ventrally of the corresponding intestine, then bends dorsad. The two transverse ducts unite in about the median sagittal plane at a point close to the acetabulum and close to the right ventro-lateral aspect of the dome of the excretory vesicle in about the same transverse plane as that in which Laurer's canal takes its departure from the oviduct. From their point of union the common vitello-duct takes its departure; it passes obliquely dorsad and to the right with a slight tilt cephalad in the direction of the shell gland which it penetrates at its left ventro-cephalic aspect and in the substance of which it unites with the oviduct. Both the transverse and common vitello-ducts contain yolk cells, but the ducts are not notably distended and no vitelline reservoir is distinguishable.

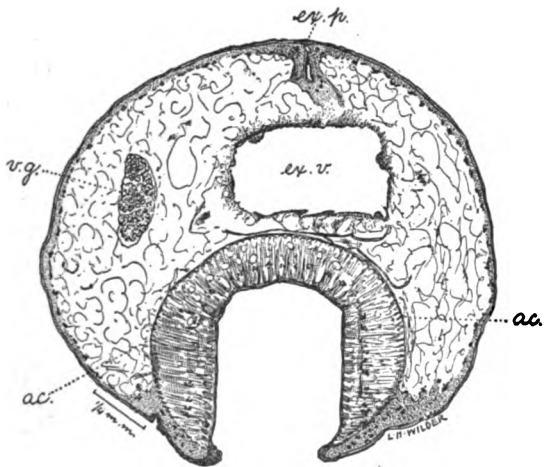


FIG. 130.

From their point of union the common vitello-duct takes its departure; it passes obliquely dorsad and to the right with a slight tilt cephalad in the direction of the shell gland which it penetrates at its left ventro-cephalic aspect and in the substance of which it unites with the oviduct. Both the transverse and common vitello-ducts contain yolk cells, but the ducts are not notably distended and no vitelline reservoir is distinguishable.

EXCRETORY SYSTEM.—A well-developed excretory vesicle is placed dorsally of the acetabulum between the latter and the dorsum. The dome of the vesicle reaches cephalad to a plane only a little caudad of that of the superior margin of the acetabulum. Caudad the vesicle extends to about the level of the caudal margin of the acetabular aperture. From the dorso-caudal aspect of the vesicle a duct

takes origin; this duct passes dorso-cephalad to open in about the median sagittal line of the dorsum (fig. 130) at a point in a transverse plane passing through about the middle of the acetabular aperture and about one-ninth the body length caudad of the opening of Laurer's canal. There is no crossing of Laurer's canal and vesicle, the former lying altogether dorsally of the dome of the latter. The excretory duct is thick walled and lined with a cuticular layer in anatomical continuity with that of the surface.

RELATION TO OTHER SPECIES.

P. shipleyi appears most closely related to *P. parvipapillatum* and *P. scoliocealum*, from both of which it differs in the somewhat greater complexity of its copulatory apparatus, which is characterized by the presence of a relatively thick ring-like partition separating the ventral chamber of the genital atrium from the dorsal chamber, the two chambers being connected by a short, narrow duct. In *P. parvipapillatum* there is no partition between ventral and dorsal chambers, the line of demarcation being a fold or groove which may be (with a certain degree of evagination of the genital papilla) almost obliterated. Besides this, however, the genital atrium and base of the genital papilla of *P. parvipapillatum* are beset by minute papillae. In *P. scoliocealum* the genital atrium forms one undivided chamber.

ILLUSTRATIONS.

FIG. 123.—Diagrammatic sagittal projection.^a *ac.*, acetabulum; *es.*, esophagus; *e. g.*, esophageal ganglion; *ex. p.*, excretory pore; *ex. v.*, excretory vesicle; *g. a.*, dorsal chamber; *g. a. c.*, ventral chamber of genital atrium; *i.*, intestines; *L. c.*, Laurer's canal; *o. s.*, oral sucker; *ov.*, ovary; *p. m.*, pars musculosa; *p. p.*, pars prostatica; *s. g.*, shell gland; *t.*, testes; *ut.*, uterus; *v. s.*, vesicula seminalis; *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, planes of section. Enlarged. Original.

FIG. 124.—Transverse section at *a-a*, fig. 123. Shows oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), and mesenterium-like strands (*m. b.*). Enlarged. Original.

FIG. 125.—Transverse section at *b-b*, fig. 123. Shows esophagus (*es.*), esophageal bulb (*es. b.*), intestinal ceca (*i.*), vitellogene follicles (*v. g.*). Enlarged. Original.

FIG. 126.—Transverse section at *c-c*, Fig. 123. Shows terminal portion of pars musculosa (*p. m.*), the pars prostatica (*p. p.*), terminal copulatory apparatus, intestinal ceca (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

^a The vertical measurements are not in accurate proportion to the dorso-ventral diameters and the dorsal line is hypothetical. It is based on a series of transverse sections, the thickness of which was not known and could not be determined accurately.

FIG. 127.—Transverse section at *d-d*, fig. 123. Shows uterus (*ut.*), coils of pars muscosa (*p. m.*), the vesicula seminalis (*v. s.*), intestinal ceca (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 128.—Transverse section at *e-e*, fig. 123, through overlapping portions of the testes; *t. d.*, cephalic testis; *t. s.*, caudal testis; *v. e. s.*, left vas efferens from caudal testis; *i.*, intestines; *ut.*, uterus; *v. g.*, vitellaria. Enlarged. Original.

FIG. 129.—Transverse section at *f-f*, fig. 123. To show pore of Laurer's canal (*L. c.*), ovary (*ov.*), shell gland (*s. g.*), uterus (*ut.*), excretory vesicle (*ex. v.*), caudal testis (*t. s.*), right and left transverse vitello-ducts (*t. vd.*), intestinal ceca (*i.*), common vitello-duct (*c. vd.*), acetabulum (*ac.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 130.—Transverse section at *g-g*, fig. 123 (level of excretory pore). *Ex. p.*, excretory pore; *ex. v.*, excretory vesicle; *v. g.*, vitellogene gland (right); *ac.*, acetabulum. Enlarged. Original.

PARAMPHISTOMUM SIAMENSE, new species.

[Figs. 131 to 136.]

SPECIFIC DIAGNOSIS.—*Paramphistomum* (p. 73): Body 6 to 9 mm. long by 4 mm. broad; rather cornucopia-like in form, greatest transverse diameter just caudad of equator; greatest dorso-ventral diameter about at cephalic margin of aperture of acetabulum; tapers at first moderately then more rapidly to a bluntly pointed oral extremity; caudal extremity bluntly rounded; longitudinal outline of lateral margins decidedly convex; anterior half of body, especially, somewhat compressed dorso-ventrally, venter somewhat concave (to some extent, at least, artifact), dorsum arched (convex) in both axes. Surface smooth, except for slight transverse ridge-like striations and a few scattered, small ventral papillæ. Genital pore ventro-medial, about one-sixth of length of body from oral end and at zone of intestinal bifurcation. Acetabulum very large, 3.5 to 5 mm., in press preparation 2.6 mm. in vertical diameter, in sagittal section anatomically terminal, but because of curving of body appears to open ventro-caudad subterminally; aperture 1.2 to 1.3 mm. in longitudinal and 1.3 to 1.4 mm. in transverse diameter, directed ventro-caudad, sunken slightly below surface of worm. Mouth terminal, leads directly into globular oral sucker the lumen of which is without papillæ; esophagus somewhat shorter than sucker; intestinal ceca long, extending about to equator of acetabulum. Excretory pore dorso-medial, cephalad of pore of Laurer's canal, 2.35 mm. cephalad of caudal extremity in a sagittal section, and about on plane of cephalic margin of acetabulum; excretory vesicle dorsal of acetabulum, long, extending from near cephalic margin of acetabulum to near caudal end of body.

Male organs: Testes situated in axial region of equatorial third of body, one dorso-caudad of the other; vasa efferentia arise on cephalic aspect of testes, vas deferens with much coiled vesicula, continued as muscosa to near base of genital papilla, where it changes to pars prostatica; short ductus ejaculatorius in papilla, joins with metraterm to form ductus hermaphroditicus, which opens at vertex of papilla, the latter projecting into a shallow atrium.

Female organs: Ovary somewhat pyriform, slightly lateral of median line, dorsal of equator of acetabulum; shell gland somewhat globular, about on same transverse plane but a little median of ovary; vitellaria with closely aggregated follicles, in lateral region, extending caudad from base of sucker to slightly beyond intestinal ceca; uterus extends cephalad from shell gland, coils ventrally of shell gland and ovary,

passes cephalad dorsally of testes, beneath arch of vasa efferentia, then cephalo-ventrad to genital papilla; it is very well developed and nearly fills space between ceca; Laurer's canal skirts right side of excretory vesicle and opens slightly distral of dorso-median line, caudad of excretory pore.

Eggs: Rather numerous, 120μ in length as measured in sections of uterus.

TYPE.—U.S.P.H. & M.-H.S. 9970.

HABITAT.—Bile ducts of a calf (*Bos indicus* var.) in Phrapatoom, Siam.

SOURCE OF MATERIAL.—This parasite was sent from Phrapatoom, Siam, by Dr. P. G. Wooley, who obtained it from the common bile ducts of a "calf" (variety of *Bos indicus*).

EXTERNAL CHARACTERS.

SIZE.—One specimen measured in glycerin alcohol was about 6 mm. long by about 4 mm. in greatest width; another measured on the slide as a press preparation was 9 mm. long.



FIG. 131.

FORM.—In form (fig. 131) the worm resembles a Sicilian fisherman's cap or a cornucopia. The caudal extremity is large, formed by the acetabulum, the aperture of which is directed ventro-caudad. The body tapers toward the cephalic extremity which is bluntly pointed and pierced by the mouth; the latter may be directed slightly forward (ventrad). The body of the animal appears somewhat compressed dorso-ventrally. The venter appears slightly excavated, due perhaps to the contraction incident to fixing. The dorsal surface is arched from side to

side, and the longitudinal axis of the body forms a curve with convexity dorsad.

SURFACE.—The surface cuticle is smooth, except for a few slight transverse striations and a few small scattered ventral papillæ near the region of the genital pore.

Genital pore.—In the ventro-median line, about one-sixth the length of the body from the oral extremity, is a slight circumscribed bulging, in the center of which is the genital pore.

Acetabulum.—The acetabulum is large and occupies the caudal portion of the body. In three press preparations it measured 3.5, 4, and 5 mm. in diameter respectively; in a sagittal section it measured 2.6 mm. in vertical diameter, with an aperture 1.23 mm. in the same diameter. In three alcohol specimens the aperture, which is directed downward and forward (ventro-caudad), measured from 1.2 to 2 mm. in longitudinal diameter and 1.3 to 1.4 mm. in transverse diameter.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The mouth, which pierces the bluntly pointed cephalic extremity, leads directly into the sucker. The latter is muscular and globular in form (figs. 132, 133, 135) and is inclosed in a well-defined space, being held in place by its attachments at its oral and basal poles and by mesenterium-like strands. Its lumen, somewhat spindle-shaped and without papillæ, leads into a short esophagus. Close to the dorso-caudal aspect of the sucker there is a transverse ganglionic cord. The esophagus, passing from its origin, appears to describe a U-shaped curve, with the base of the U ventrad, and then divides into two intestinal ceca. The intestinal ceca pass latero-ventrad from their point of origin and after approaching the lateral margin, from which they are separated by the vitelline glands, they change their course caudad. They terminate by blind extremities at about the level of the equator of the acetabulum. The cecal end of the right intestine extends a little farther caudad than that of the left. In transverse section they are of irregular, variable outline, and of considerable and variable caliber in the same specimen. The lumen of the sucker and esophagus is lined by a thin layer of cuticle which ceases abruptly at the esophageal fork. The intestinal ceca are lined by a layer of epithelium.

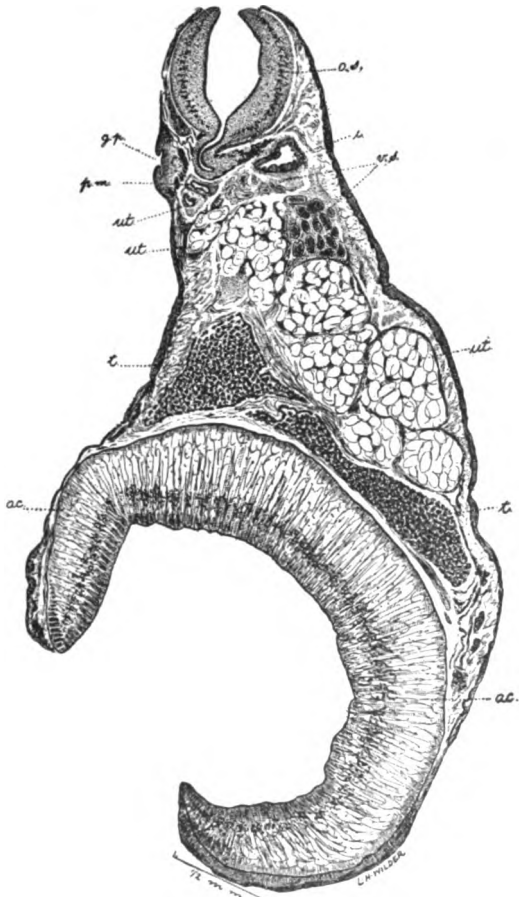


FIG. 132.

GENITAL SYSTEM.—*Male organs.*—The testes (fig. 132) are placed one dorso-caudad or latero-caudad of the other in the axial region of

the equatorial third of the body. They appear crowded together, so that the contiguous portions may overlap. In one of the specimens the degree of this overlapping was very great, whereas in another there was none at all, the testicular zones being separate, though contiguous.

The form of the testes is irregular and varies in the different specimens; this variation is probably due partly to a difference in the degree to which the uterus is filled with eggs and partly to the degree of general contraction in the fixing and hardening processes. As seen in sections, their surface is more or less indented. There appears also to be considerable variation in their position in relation to the acetabulum. In some specimens the posterior testis is above (cephalad of) the upper margin of the acetabulum; in others (figs. 132,

136) it extends to the equator of the acetabulum, the caudal aspect of the anterior testis appearing to rest on the upper margin of the acetabulum.

In neither of two series of transverse sections could the two vasa efferentia be followed for quite their entire extent, although in one of them only a very small portion of their course was not observed. Completing this portion from the other series, the following results were obtained:

A vas efferens rises from each testis; that from the right (or

caudal) testis springs from the superior (cephalic) margin of the right lateral aspect and passes cephalad close to the right lateral aspect of the superior (or left) testis.

The vas efferens of the left (or superior) testis springs from the cephalic aspect of the latter and passes mediad and slightly caudad to unite with the right vas efferens to form the vas deferens. The latter is directed dorsad and almost at once dilates to form the much-coiled thin-walled vesicula. The latter passes ventrad, its wall becomes thick and its lumen becomes contracted (pars muscosa); as this latter approaches the base of the genital papilla it becomes surrounded by a large mass of cells (pars prostatica) which disappears as the duct enters the papilla. The exceedingly short terminal portion or ductus ejaculatorius joins with the metraterm in a common canal, the ductus hermaphroditicus, which opens at the vertex of the genital papilla (fig. 132).

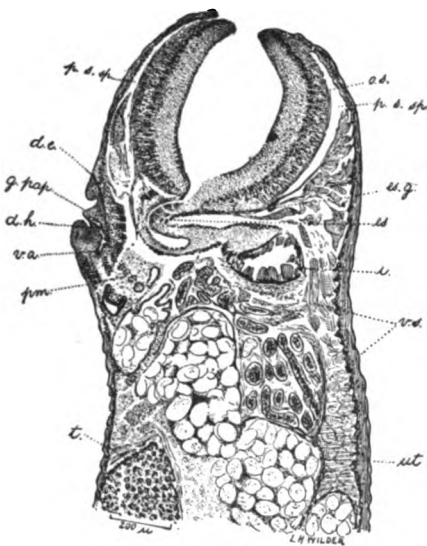


FIG. 133.

Female organs.—The ovary (fig. 136) lies a little to the left of the median line in the caudal portion of the body, dorsally of and in a plane passing through about the equator of the acetabulum. It is somewhat pear-shaped, with its larger pole to the right. From this extremity the oviduct arises and passes to the shell gland. The shell gland is close to and a little to the right of the ovary and in about the same transverse plane. It is somewhat globular, with a diameter about equal to the ventro-dorsal diameter of the broader end of the ovary. It is pierced on its left aspect by the oviduct and on its caudal aspect by the vitello-duct which joins the former; the

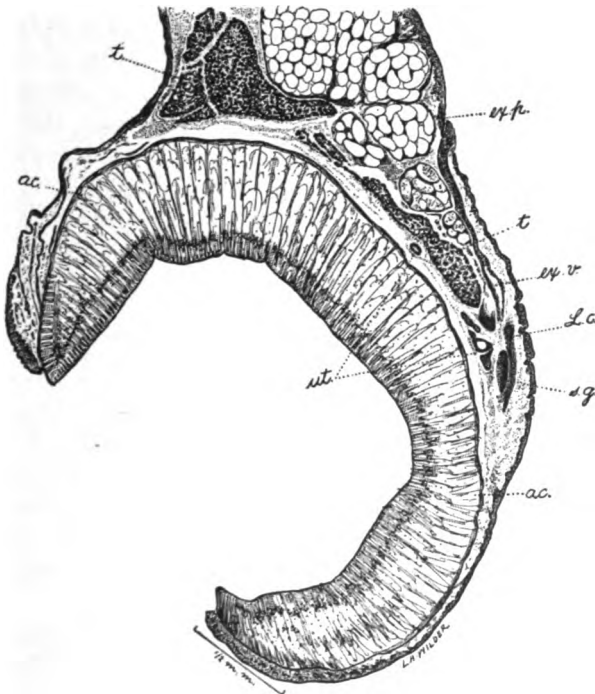


FIG. 134.

duct formed by their union is directed obliquely cephalad and to the right dilating to form the ootype, beyond which it is continued as the uterus. The uterus emerges from the cephalic or ventro-cephalic aspect of the shell gland and proceeds cephalad, first forming some coils ventrally of the shell gland and ovary. In its course cephalad it passes dorsally of the testes, and its coils, with lumen distended with eggs, fill the space between the intestinal ceca. Above the level of the anterior testis it forms coils beneath the vas deferens and passes ventrad toward the genital papilla, and opening, as already mentioned, into a short duct common with it and the male canal. The genital pore opens on the ventral surface at the level or slightly

cephalad of the esophageal fork. It leads into a shallow atrium, the dorsal wall of which is formed by a low conical papilla at the vertex of which is the opening (porus hermaphroditicus) of the short duct (ductus hermaphroditicus) into which, as has been noted, the male and female canals open.

The vitellogene glands consist of well-developed follicles (of the type of *P. cervi*), more or less closely aggregated close underneath the lateral body walls. They are found not only laterally, but also dorsally and ventrally of the ceca. They begin about at the level of the base of the sucker and extend into the caudal portion of the body to a point a little beyond the termination of the intestinal ceca. A duct leaves each gland a little below the level of the upper margin of the acetabulum and passes ventrad of the corresponding intestine toward the shell gland, near the ventro-caudal aspect of which they unite to form a dilated reservoir (fig. 136). From this reservoir a

slender duct arises and pierces the caudal aspect of the shell gland to join the oviduct.

Laurer's canal springs from the oviduct just as the latter is about to enter the shell gland. It describes a slight curve to the right around the corresponding margin of the excre-

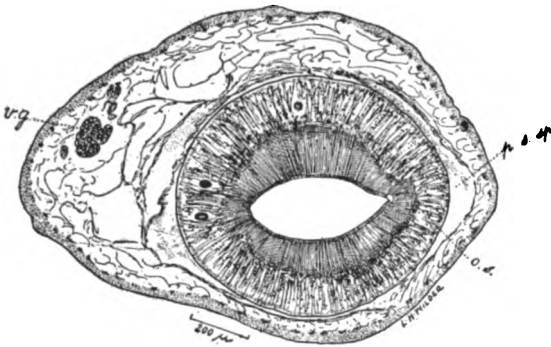


FIG. 135.

tory vesicle, to open on the dorsal surface a little below the excretory pore, slightly to the right of the median line.

EXCRETORY SYSTEM.—Only the excretory vesicle, terminal canal, and excretory pore could be satisfactorily traced. The vesicle lies in the caudal portion of the body dorsally of the acetabulum. Its fundus extends to near the caudal extremity of the worm, and its body extends cephalad close under the dorsum to the level of the upper margin of the acetabulum, at which it terminates by a short duct which opens in the dorso-median line (fig. 134) at the excretory pore, and about 2.35 mm. from caudal extremity, measured in sagittal section.

RELATIONS TO OTHER SPECIES.

This species resembles *Paramphist. cervi* and *P. fraternum*. It differs from *P. cervi* in the form of the body, that of *P. cervi* being more slender and more elongate; in the size of acetabulum, that of *P. cervi* being definitely smaller; in the position of the genital pore, that

of *P. cervi* being relatively farther caudad, about one-third of the body length from the oral margin and at or caudad of the esophageal fork, whereas in this species the genital pore is only about one-sixth the body length from the oral margin at or cephalad of the esophageal fork—that is, relatively much nearer the level of the base of the sucker than is the genital pore of *P. cervi*.

From *P. fraternum* also it differs in the form of the body, that of *P. fraternum* being markedly less flattened and its cephalic third decidedly more slender and more nearly conical; in the size of the acetabulum, that of *P. fraternum* being relatively smaller; in the posi-

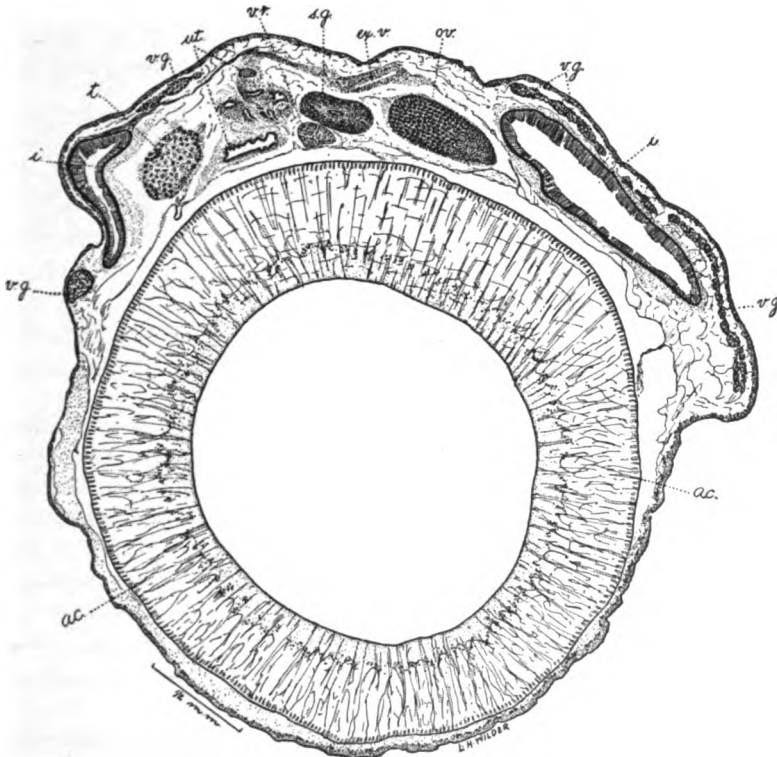


FIG. 136.

tion of the genital pore, that of *P. fraternum* being proportionately nearer the oral extremity, namely, about one-eighth the body length from this extremity and at or slightly cephalad of the level of the base of the sucker.

ILLUSTRATIONS.

FIG. 131.—Ventral aspect. Enlarged. Original.

FIG. 132.—Sagittal section. Shows oral sucker (*o. s.*), section of right intestinal cecum (*i.*), the two testes (*t.*), the vesicula seminalis (*v. s.*), the pars muscosa (*p. m.*), the genital pore (*g. p.*), the uterus (*ut.*), and the acetabulum (*ac.*). Enlarged. Original.

FIG. 133.—Sagittal section of oral extremity. Shows oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), esophagus (*es.*), section of right intestinal cecum (*i.*), the vesicula seminalis (*v. s.*), pars muscosa (*p. m.*), ductus ejaculatorius (*d. e.*), ductus hermaphroditicus (*d. h.*), genital papilla (*g. pap.*), the metraterm (*va.*), uterus distended with eggs (*ut.*), and cephalic portion of superior testis (*t.*). Enlarged. Original.

FIG. 134.—Sagittal section of caudal extremity. Shows acetabulum (*ac.*), the testes (*t.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), Laurer's canal (*L. c.*), shell gland (*s. g.*), and uterus (*ut.*). Enlarged. Original.

FIG. 135.—Transverse section, shows oral sucker (*o. s.*), perisuctorial space (*p. s. sp.*), and follicles of right vitellogene gland (*v. g.*). Enlarged. Original.

FIG. 136.—Transverse section through caudal extremity of right (caudal) testis (*t.*). Shows position and relations of ovary (*ov.*), shell gland (*s. g.*), vitelline reservoir (*v. r.*), uterus (*ut.*), vitellaria (*v. g.*), intestinal ceca (*i.*), and acetabulum (*ac.*). Enlarged. Original.

STEPHANOPHARYNGINÆ, new subfamily.

SUBFAMILY DIAGNOSIS.—(*Paramphistomidæ*, p. 60): Oral sucker with circular evagination.

TYPE GENUS.—*Stephanopharynx* Fischæder, 1901.

The circular evagination of the oral sucker appears to be an important character. At first thought it seems more important than the sexual characters, still, when one recalls that the intestinal characters of the distomes are not of such great value as one is tempted to accord to them, it is not absolutely excluded that subfamily value is higher than this character justifies. Accordingly, this subfamily is proposed with some reserve.

The one genus (*Stephanopharynx*) known for this group, presents also the following important characters: Genital sucker and cirrus pouch absent, body not divided.

Fischæder classified *Stephanopharynx* in *Paramphistominæ*. With this view it is difficult to concur, and if *Stephanopharynx* were classified with the *Cladorchiinæ*, there should be a distinct tribe erected for it.

Genus STEPHANOPHARYNX Fischæder, 1901.

GENERIC DIAGNOSIS.^a—*Stephanopharynginæ* (p. 168): Body compressed, slightly concave ventrad, convex dorsad, but slightly flattened dorso-ventrally, cephalic and caudal ends rounded, sides excurvate longitudinally. Ventral pouch absent. Acetabulum ventro-subterminal, large, not sunken, margin not raised, aperture large. Genital pore with considerable musculature which is not sharply defined in form of a sucker, atrium divided into large ventral and small dorsal chamber, ductus hermaph-

^a Based on Fischæder, 1903h.

roditicus present. Excretory pore prevesicular in acetabular zone, caudad of Laurer's canal. Oral sucker with circular evagination, larger dorsally than ventrally; esophagus without muscular thickening; ceca very wavy, end postequatorial, posttesticular.

Male organs: Testes 2, smaller than acetabulum, with small lobes, fields nearly coincide, zones abut or separate, preovarial, not widely separated from acetabulum, in equatorial and caudal thirds; musciosa well developed, but not enormous; cirrus pouch absent.

Female organs: Ovary and shell gland posttesticular; vitellaria pre- and cecal, profuse; uterus intercecal; eggs many; Laurer's canal entirely preexcretory.

TYPE SPECIES.—*S. compactus* Fischæder, 1901.

Subfamily CLADORCHINÆ Fischæder, 1901.

SUBFAMILY DIAGNOSIS.—*Paramphistomida* (p. 60): Oral sucker with a pair of evaginations.

TYPE GENUS.—*Cladorchis* Fischæder, 1901.

Fischæder included in this subfamily the genera *Cladorchis* (subg. *Cladorchis*, *Tazorchis*, and *Stichorchis*), *Chiorchis*, *Gastrodiscus*, *Homalogaster*, and (as doubtful) *Diplodiscus*.

We have separated out (see p. 249) *Gastrodiscus* and *Homalogaster*, thereby restricting the group in one sense, and by eliminating certain characters from the subfamily diagnosis we have widened the scope of the group in another sense. It is very possible that the group may undergo further changes on basis of the different kinds of evaginations.

Genus CLADORCHIS Fischæder, 1901.

GENERIC DIAGNOSIS.^a—*Cladorchiniæ* (p. 169): Genital pore with sucker. Evaginations of oral sucker recognizable outside the wall of the sucker; esophagus without muscular thickening.

Male organs: Testes branched.

TYPE SPECIES.—*C. pyriformis* (Diesing, 1838) Fischæder, 1901.

Fischæder divides this genus into 3 subgenera, but it seems to us possible that his genus *Chiorchis* is perhaps of tribal value and his subgenera of generic value.

Subgenus CLADORCHIS Fischæder, 1901.

SUBGENERIC DIAGNOSIS.^a—*Cladorchis* (p. 169): Body rather pyriform, venter flattened to convex, dorsum convex, cephalic end attenuate, caudal end rounded. Ventral pouch absent. Acetabulum caudal, ventral, rather large to large, apparently sunken or not sunken, margin apparently raised or not raised, aperture circular, apparently medium to large. Genital pore with sucker, ductus hermaphroditicus present. Excretory pore postvesicular, post- or acetabular, caudad of pore of Laurer's canal. Oral sucker with paired strongly developed evaginations, and with not sharply bounded sphincter; esophagus without muscular thickening; ceca very wavy, long, end postequatorial, posttesticular, post- or acetabular.

Male organs: Testes 2, smaller than acetabulum, branched, fields abut, zones nearly coincide, preovarial, near acetabulum, in equatorial third, near venter; cirrus pouch present.

^a Based on Fischæder, 1903h.

Female organs: Ovary and shell gland posttesticular; vitellaria in cecal zone, testicular and post-, may be pretesticular, stretching ventrally and dorsally; uterus intercecal; Laurer's canal entirely prevesicular.

TYPE.—*C. pyriformis* (Diesing, 1838).

HABITAT.—Cecum of South American *Tapirus*.

Subgenus STICHORCHIS Fischöder, 1901.

GENERIC DIAGNOSIS.^a—*Cladorchis* (p. 169): Body straight, venter rather flat, dorsum convex, cephalic third notably attenuate, caudal end attenuate but rounded. Ventral pouch absent. Acetabulum caudal, ventral, slightly sunken, margin (?), aperture circular, large. Genital pore with sucker, latter with distinct sphincter. Excretory pore apparently postvesicular, in acetabular zone, caudad of pore of Laurer's canal. Oral sucker with sphincter and paired evaginations; esophagus without muscular thickening; ceca slightly wavy, long, end postequatorial, posttesticular, in acetabular zone.

Male organs: Testes 2, about as large as acetabulum, branched, fields and zones overlap, preovarial, somewhat separated from acetabulum, near venter, in equatorial third; cirrus pouch small.

Female glands: Ovary and shell gland almost entirely posttesticular; vitellaria from bifurcal to postcecal zones; uterus intercecal; eggs (?); Laurer's canal entirely prevesicular.

TYPE SPECIES.—*S. giganteus* (Diesing, 1835).

Genus TAXORCHIS (Fischöder, 1901).

GENERIC DIAGNOSIS.^a—*Cladorchiinae* (p. 169): Body elongate, flattened, venter flat, dorsum somewhat convex. Ventral pouch absent. Acetabulum terminal, rather large, aperture elongate. Genital pore with sucker, ductus hermaphroditicus present. Excretory pore (?). Oral sucker with sphincter and well-developed paired evaginations; esophagus without muscular thickening; ceca broad, slightly wavy, near dorsum, long, end postequatorial, posttesticular, in acetabular zone.

Male organs: Testes 2, nearly as large as acetabulum, branched, fields separate, zones coincide, preovarial, preequatorial, widely separated from acetabulum and ovary; cirrus pouch present.

Female organs: Ovary and shell gland posttesticular, near acetabulum; vitellaria in cecal zone, entirely posttesticular; uterus intercecal, chiefly posttesticular, unusually well developed, first runs near dorsum cephalad to testes, then diagonally caudad near venter, then near venter cephalad to pore; ova numerous. Laurer's canal (?).

TYPE.—*T. schistocotyle* Fischöder, 1901.

HABITAT.—Cecum of Brazilian *Dicotyles*.

Fischöder gives *Taxorchis* as a subgenus of *Cladorchis*, but the form and position of the testes and the position of the uterus seem to us to entitle it to generic rank.

Genus PSEUDODISCUS Sonsino, 1895.

1895: *Pseudodiscus* and *Amphist.* (*Pseudodiscus*) Sonsino, 1895, 5, 8 (for *hawkersi*, *collinsi*, *ornatum*); 1895, 184, 185, 186; 1896, 310.—Fischöder, 1903h, 489, 631-632.—Piana & Stazzi, 1900a, 523.

GENERIC DIAGNOSIS.—*Cladorchiinae* (p. 169): Body oval, venter convex to concave, dorsum convex, cephalic end less blunt than bluntly rounded caudal end, transverse section elliptical. Ventral pouch absent. Acetabulum ventral relatively small, margins prominently projecting. Genital pore postbifurcal without sucker, ductus

^a Based on Fischöder, 1903h.

hermaphroditicus present. Excretory pore postvesicular, in postacetabular zone, caudad of pore of Laurer's canal. Oral sucker prominently constricted at equator, with a pair of evaginated horns, each with a globular pouch; esophagus without muscular thickening; ceca wavy, long, end postequatorial, posttesticular, in acetabular zone.

Male organs: Testes 2, smaller than acetabulum, cauliflower-like, testicular fields separate, zones coincide, preovarial, considerably or slightly removed from acetabulum, chiefly or entirely in equatorial third, near venter; musculosa not enormously developed; cirrus pouch absent.

Female organs: Ovary and shell gland chiefly posttesticular; vitellaria extend extracecal about from buccal pouches to acetabulum; uterus intercecal, chiefly posttesticular; ? eggs; Laurer's canal cephalad and dorsal of excretory vesicle.

Eggs: Not observed.

TYPE SPECIES.—*Amphist. stanleyi* Cobbold, 1875, from *Equus caballus* in India, type by present designation.

Hosts.—Horses and elephants.

This genus is left provisionally in the subfamily *Cladorchiinæ*, although indications are not entirely absent that it may eventually be eliminated from this group.

Sonsino (1895, anno 6, 5, 8) proposed this genus as a member of the *Amphistomidæ* and gave to it the following generic diagnosis:

Corpo allungato, convesso pianeggiante, senza manico anteriore distinto. Ventosa posteriore subterminale piccola.

He included in the genus the species: *Amphist. hawkesi* [*stanleyi*] *collinsi*, and *ornatum*.

Piana & Stazzi (1900, 523) accept Sonsino's genus, adding to its diagnosis the phrase: "La faringe coi due diverticoli e il bulbo esofageo muscolosa."

Fischæder (1902a, 48–49) gives the species *Amphist. hawkesi*, *collinsi*, *stanleyi*, and *ornatum* as species inquirendæ.

Fischæder (1903h, 489, 631–632) mentions the genus *Pseudodiscus*, but in view of the slight anatomical details then known for its species he lists them all as species inquirendæ of *Amphistomum*.

In reference to the species which come into consideration as members of this genus, Cobbold (1879b, 357–359, 398) states:

More importance attaches itself to the study of the amphistomatoid flukes [in equines]. These parasites, though in a scientific sense only recently discovered in equine bearers, have been long known to the natives of India. They appear to be capable of producing serious intestinal irritation. I have described two forms (*Amphistoma collinsi* and *A. coll. var. stanleyi*, which infests the colon. The specimens sent to Professor Simonds from India by Mr. Stanley, V. S., were much larger than those sent to me from Simla by Mr. Collins, V. S., some ten years later (1875). As in all other amphistomes obtained from the intestines of elephants and cattle the worms, when fresh, were of a bright brick-red color. By the natives of India these parasites are called *Masuri*; but no description of the worms had been published prior to the account which I gave of the contributions forwarded by Major-General Hawkes, Mr. Collins, and Mr. Stanley.

I shall have occasion to speak of the elephant's *Masuri* further on; but in the meantime I must remark that the generally received notion as to the parasitic cause of the

earth-eating propensities of various animals seems to have some foundation in fact. Not alone from Major-General Hawkes in Madras, from Mr. Folkard in Ceylon, and from various other trustworthy sources, have I been informed of this habit on the part of Indian horses; but Doctor Rowe told me that Australian horses, and even sheep, infested with stomach worms, are in the constant habit of consuming large quantities of sand. From all the facts that have come before me, I am inclined to think that gastric or intestinal irritation, however brought about, may induce the habit in question, parasites being only one of the many sources of irritation giving rise to symptoms of colic in solipeds and pachyderms alike. At all events the African elephants at the London Zoological Society's menagerie, as repeatedly witnessed by myself, are in the habit of swallowing large quantities of soft mud during the summer months, but no traces of *masuri* have as yet been detected in their faeces.

When by letter I informed Major-General Hawkes of an interesting find by Mr. Collins of *about a thousand* Amphistomes in the colon of a horse that had died at Simla, the announcement called forth a reply which is sufficiently instructive to be quoted. Writing from Secunderabad, in July, 1875, he says respecting this "find:" "Your statement has incidentally thrown light upon a subject which has puzzled many of us in this country. It occasionally happens that a horse, on being opened after death, is found to have accumulated in his intestines large quantities of sand and gravel. In a recent case this accumulation amounted to 14½ pounds. Until recently it was always held that this gravel or sand could only be introduced with the animal's food. All grain in this country is trodden out by bullocks on an earthen floor, and the grain undoubtedly contains a proportion of sand and gravel derived from this source. Although this ought to be carefully washed out before it is given to the horse, still, owing to the carelessness of the native horse keepers, this cleaning is, I expect, often omitted. In the daily 'feed' of 8 or 10 pounds of grain given to each horse the utmost quantity of sand or gravel that could be found admixed therewith would not probably exceed 2 or 3 ounces. Consequently it would take from seventy-seven to one hundred and sixteen days to accumulate so large a quantity as 14½ pounds. Now, the advocates of the theory of the gradual accumulation of sand in this way have never been able to explain why the grain, grass, hay, and other ingesta should pass in the ordinary way through the intestines whilst this sand or gravel remains behind. One can understand the possibility of such substances as wool, hair, or similar matters concreting in the alimentary canal, though I believe they are usually found in the stomach and not in the intestines; but how a most incohesive substance, like sand, can possibly accumulate in the gradual way required by their theory I have never heard even plausibly explained. On the other hand, the fact that horses are often excessively addicted to eating earth is well known; and if my memory serves me correctly, it was found necessary, about twenty years ago, to remove the mud walls of the pickets surrounding some of the horses of a mounted corps in this presidency in consequence of this habit. Now, given the fact that the amphistoma has been found in the horse (as your specimens prove), may we not fairly suppose it possible that the animal resorts to the same mode of ridding himself of this parasite as does the elephant; and, also, would it not in a much more natural manner account for the large quantity of gravel or sand found in the intestines than does the theory of gradual accumulation? Reasoning from analogy, as in the case of the elephant, this eating of earth in the horse would be an instinctive effort on the part of the 'host' to rid himself of the parasite. This self-taken remedy is doubtless in many cases quite effectual, though unnoticed. The fatal cases are probably those in which the horse has either overdone the remedy or where the system was too debilitated to carry off a quantity of sand or gravel that would otherwise have safely passed through the intestines of a horse in more robust health. The actual fact must, of course, be verified by careful investigation."

When describing the parasites of the horse (p. 358), I spoke of Collins's amphistome from that animal; but in the letter addressed to me from Simla, March 22, 1875, Mr. Collins made no allusion to the earth-eating habit. He wrote: "I forward you by this mail parasites found in the colon of a horse that died, a subject of fever peculiar to this country. There were about a thousand of the parasites, and nearly the whole of them were situated close to the cæcum and were loose in the gut. Not having seen parasites at all similar to these, I have forwarded them for identification. They were of a brick-red color when first obtained." These explicit statements by Mr. Collins are interesting from many points of view. One has only to place his specimens side by side with those from the elephant in order to satisfy one's self that the two forms are distinct. For the reasons already stated, I provisionally called the worm *Amphistoma collinsii*. It is probable that other veterinary surgeons have encountered this entozoon in India; but unless they can point to some published account of the fact Mr. Collins is entitled to be considered as its discoverer. Doubtless many other European residents in India, Ceylon, and Burmah must, like Doctor Gilchrist, be well acquainted with the *masuri* as such, though unaware of their zoological position.

The known species^a of *Pseudodiscus* may be distinguished by the following key:

- α^1 . Testicular zones nearly or quite coincide, fields separate; esophagus without muscular thickening.....subg. *Pseudodiscus*, p. 173.
- β^1 . Testes more than half as large as acetabulum; intertesticular field less than half as broad as testicular field; body 8.6 to 9 mm. long; type host *Equus caballus*, India.....*Ps. stanleyii*, p. 173.
- β^2 . Testes less than half as large as acetabulum; intertesticular field much broader than testicular field; body 5 to 5.7 mm. long; type host *Equus caballus*, India.....*Ps. collinsii*, p. 187.
- α^2 . Testicular zones separate, nearly abut, fields nearly or quite coincide; esophageal muscular thickening present; type *hawkerii*.....subg. *Hawkerius*, p. 200.
- β^3 . Body 3.5 to 5 mm. long; type host *Elephas indicus*, India...*Ps. hawkerii*, p. 200.

Subgenus PSEUDODISCUS.

SUBGENERIC DIAGNOSIS.—*Pseudodiscus* (p. 170): Esophageal muscular thickening absent. Testicular zones nearly or quite coincide, fields separate.

TYPE SPECIES.—*Ps. stanleyii*.

PSEUDODISCUS STANLEYII (Cobbold, 1875) Stiles & Goldberger, 1910.

[Figs. 137 to 151.]

1875: *Amphist. stanleyii* Cobbold, 1875n, 818, 819 as possible syn. of *Amphist. collinsii* [in *Equus caballus*, India].

1879: *Amphist. collinsii* var. *stanleyi* Cobbold, 1879b, 357 for *stanleyii* 1875 (in *Equus*).—Piana & Stazzi, 1900a, 519, as syn. of *hawkeri*.—Sons., 1895, 182.

1895: *Amphist. collinsii* var. *stanleyi* Cobbold.—Sons., 1895, 4 syn. of *Amphist. hawkeri*.—Fischæder, 1902a, 48; 1903h, 631, 632.

1895: *Amphist. stanleyi* Cobbold.—Ward, 1895, 338 as syn. of *A. collinsii* (in *Equus caballus*).—Fischæder, 1902, 48.

SPECIFIC DIAGNOSIS.—*Pseudodiscus* (p. 170): Body 8.6 to 9 mm. long by 5.5 to 5.6 mm. broad, by 3.5 to 4 mm. thick; flesh color (alcohol specimen); oval, somewhat flattened dorso-ventrally, cephalic extremity bluntly pointed, caudal extremity very

^a Except *ornatus*, for which definite data are lacking.

bluntly rounded; lateral margins convex, greatest diameter (both transverse and sagittal) about at caudal end of equatorial third of body; cephalic extremity bears bluntly pointed slender papillæ. Genital pore ventro-median in cephalic portion of equatorial third, about midway between oral extremity and anterior margin of acetabulum, postbifurcal. Acetabulum ventro-subterminal, 1.7 mm. in diameter, aperture circular, 1 to 1.25 mm. in diameter, surrounded by a distinctly raised margin; cavity rather shallow. Mouth terminal; oral sucker constricted at equator into globular oral and bibulbous esophageal portions; each lateral bulb connects with a globular pouch; the bibulbous portion of sucker and the pouches lie on each side in a cavity, but are bound dorsally and ventrally to the parenchyma by mesenterium-like bands; esophagus arises from base between bulbs and extends (at first in the ventral mesenterium-like band) nearly to border between cephalic and equatorial thirds of body; ceca long, extend caudad slightly beyond equator of acetabulum, each forming in its course 2 strongly convex lines latero-dorsad, which come together near caudal margin of testis. Excretory pore dorso-median, caudad of acetabulum; excretory vesicle well developed, dorsal of acetabulum.

Male organs: Testes large, somewhat lobulated or cauliflower-like, ventral, equatorial, postbifurcal, preacetabular, their center slightly nearer caudal than cephalic margin; vasa efferentia spring from dorsal aspect, run cephalo-mediad, then mediad, unite about in median line slightly caudad of equator of body to form vas deferens; vesicula seminalis intricately coiled, moderately dilated; pars muscosa dilated, moderately coiled, extends slightly cephalad of genital pore; pars prostatica relatively short, vesicular, dorsal of pore, with short narrow muscular canal (ductus ejaculatorius) to the short ductus hermaphroditicus which leads to the pore; cirrus pouch absent.

Female organs: Ovary and shell gland submedian, posttesticular, preacetabular, nearer acetabulum than testes, ovary cephalad of shell gland; vitellaria, with well-developed follicles, lateral of ceca, extend about from base of esophageal pouches to or slightly caudad of intestinal ceca; vitello-ducts arise about at plane of shell gland; uterus forms coils dorso-mediad of ovary, then passes cephalo-ventrad in suctorial field between testes, crossing ventrally of vasa efferentia, and runs in but slight coils ventrad of vas deferens to enter ductus hermaphroditicus dorsal of pore; Laurer's canal runs from its origin (between dorsal margin of ovary and shell gland) caudo-dorsad to dorso-median line slightly caudad of cephalic margin of acetabulum.

Eggs: Not observed.

TYPE.—U.S.N.M. (Coll. Stiles) 5274; cotype U.S.N.M. (Coll. Hassall) 5779, sectioned and used as basis for present anatomical discussion.

HABITAT.—Colon of the horse (*Equus caballus*), India.

SOURCE OF MATERIAL.—The material used as basis of this discussion represents some of Cobbold's original specimens which he gave to Hassall; the latter brought them to this country. Cobbold was not in the habit of designating any particular specimen as type, but Hassall has designated 5274 as such on the label.

HISTORICAL REVIEW.—In the first mention of the name *Amphistoma stanleyi* Cobbold (1875n, 818, 819) states that the parasites were collected by Edward Stanley, jr., from the colon of the horse in India; in size they appear nearer to *A. hawkesii* than they do to *A. collinsii*, still "this is apparently nothing more than a large variety of the above [*collinsii*] (?)."

Ward (1895, 338) merely mentions this form as a synonym of *Amphist. collinsi*, in a list of parasites of the horse.

Sonsino (1895, 4), quoting Cobbold, mentions the worm nym of *Amphist. hawkesi*.

Fischæder (1902a, 48; 1903h, 631, 632) quotes the measure as 10 mm. long by 6 mm. broad, states that this form occurs in the colon of *Equus caballus* in India, and marks the parasite as a species inquirenda.

EXTERNAL CHARACTERS.

SIZE.—The specimens, preserved in alcohol, measure 9 mm. and 8.6 mm., respectively, in length; 5.5 and 5.6 mm. in greatest width, and 3.5 and 4 mm., respectively, in greatest dorso-ventral diameter.

COLOR.—The worms are of a flesh tint.

FORM.—The worms are ventro-dorsally somewhat flattened oval objects, with a bluntly pointed oral and a broad rounded caudal extremity (figs. 137, 138). The greatest transverse and ventro-dorsal diameters are about in the region of junction of the middle and caudal third of the body. In transverse sections the form of the body is somewhat that of an ellipse.

SURFACE.—The surface of the oral pole is beset by small bluntly pointed, quite slender papillæ. They present the appearance of spines, but any doubt as to their interpretation was dissipated on sectioned specimen.



FIG. 138.

Genital pore.—On the ventral surface, on the median longitudinal line, about midway between the oral extremity and the anterior acetabular aperture, is the genital pore. This pore is situated in about the center of a broad shallow depression of the ventral wall. In sections it is seen that what appears to be the genital pore is a fairly large circular opening that leads into a circular slit-like atrium in the dorsal wall of which appears a median longitudinal slit which leads into another, somewhat larger, chamber. On the dorsal wall of this chamber is the opening of the ductus hermaphroditicus. These atria and the ductus hermaphroditicus are lined by a globular mesh of muscular fibers (fig. 146).

Acetabulum.—The acetabulum is in the caudal portion of the body with its aperture ventro-subterminal. In one specimen it (in sections) about 1.7 mm. in diameter; the aperture of the

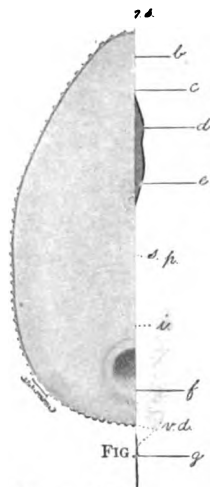


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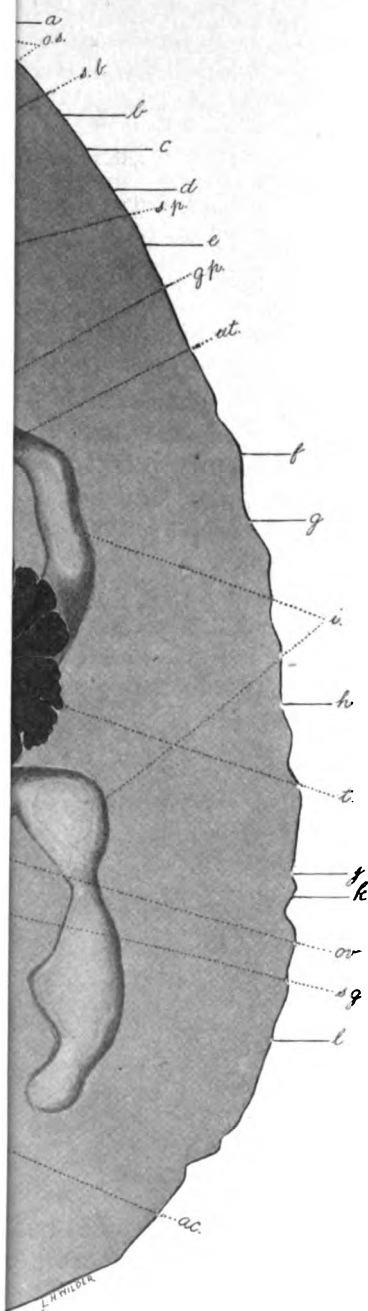
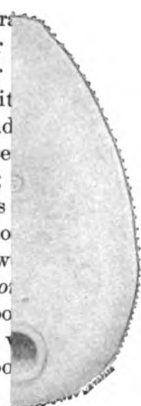
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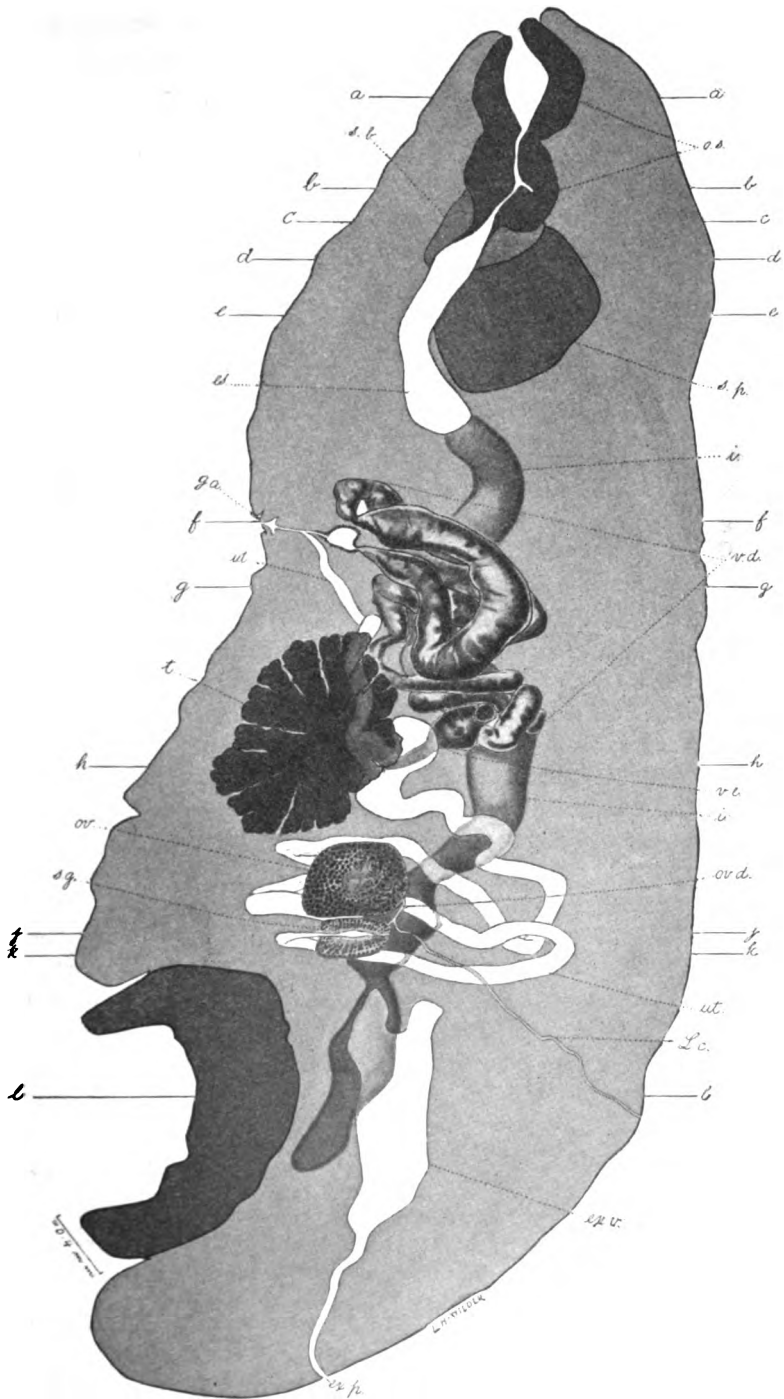


FIG. 140.

ulum in the 2 worms measured 1 mm. and 1.25 mm., respectively, in diameter. This aperture is surrounded by a narrow ring which is marked off from the general surface by a deep and more or less narrow circular groove. This ring is seen in sections to be part of the acetabulum (fig. 151).

The cavity of the acetabulum is relatively shallow.

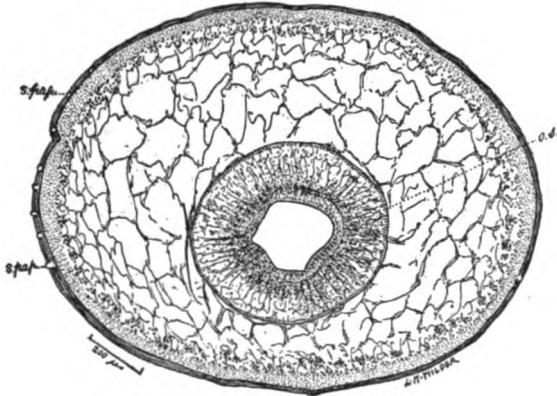


FIG. 141.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—

The oral aperture, which pierces the cephalic extremity of the worm and is unprovided with a sphincter, leads directly into a muscular sucker. The latter

shows a well-marked constriction or isthmus at about its equator, which divides it transversely into two portions almost equal in length—the anterior, which may be designated as the oral, and the posterior, as the esophageal (or bulbous) portion. The oral portion of the sucker is somewhat globular in form, measuring (in sections) about 0.64 mm. in longitudinal axis, 0.64 mm. in transverse, and 0.58 mm. in ventro-dorsal diameter. The esophageal or bulbous portion differs in form quite markedly from the oral portion (figs. 139, 140, 141, 142, 143). It measures (in sections) about 0.50 mm. in longitudinal axis and 0.48 mm. in greatest ventro-dorsal diameter. In transverse diameter this part of the sucker is narrowest at the constriction marking its anterior limit, where it measures 0.40 mm., but it increases rapidly to a maximum width of 1.10 mm. at its base, namely, at the level at which the esophagus takes its departure. In sections it is seen that this increase in width is due to the formation of lateral bulbs which extend caudad on either side of and in line with the esophagus for a distance (measured in the long axis of the bulb) of about 0.40 mm. beyond

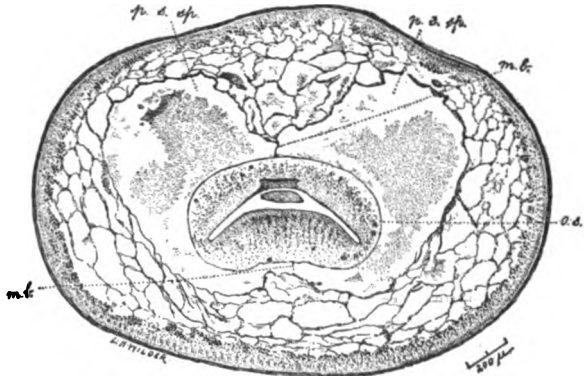


FIG. 142.

the level or plane of origin of the esophagus (figs. 139, 140). Attached to the dorso-caudal aspect of these bulbs there is on each side a globular pouch.

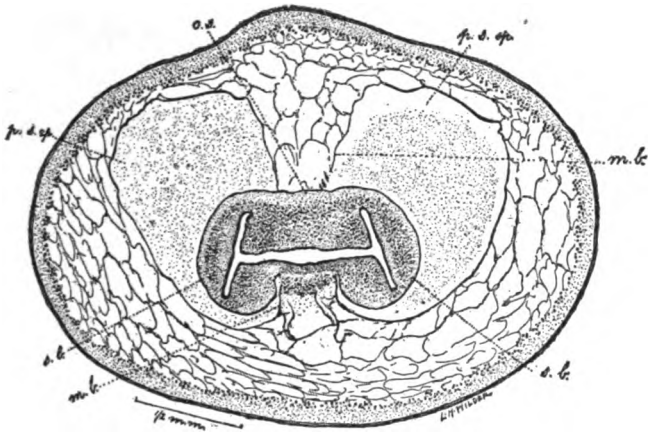


FIG. 143.

In consequence of this relation between the pouches and the corresponding bulbs, the former are found close to, on either side, and slightly dorsad of the esophagus. The sucktorial bulbs, which are an integral part of the sucker, are, like the latter, muscular in structure. The portion of these bulbs which on surface inspection is seen to

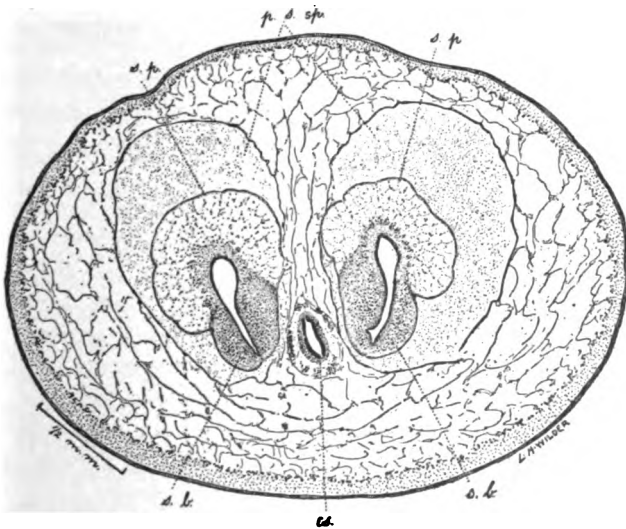


FIG. 144.

extend beyond the base of the sucker, that is, caudad of the level of origin of the esophagus, measures about 0.40 mm. in its longitudinal axis, about 0.56 mm. in its greatest dorso-ventral diameter, and about

0.40 mm. in its greatest transverse diameter. The suctorial "pouches" (which are here distinguished from the "bulbs") are in a general way globular in form. Their long axes have about the same direction as the long axis of the worm itself and exceed their transverse diameter by about 0.20 mm., the latter measuring about 0.80 mm. In structure the pouches are entirely different from the bulbs. The walls of each pouch, which measure about 0.30 mm., are made up of parenchyma-like cells and some muscular fibers. These parenchyma-like cells, though large, are much smaller than those of the body parenchyma, from which they are sharply separated by a thin membranous layer which at the same time forms the outer covering of the wall of the pouch. Beneath the lining cuticle is a layer of structures which are very irregular in size and which at first sight are not very easy to interpret; they have something of the

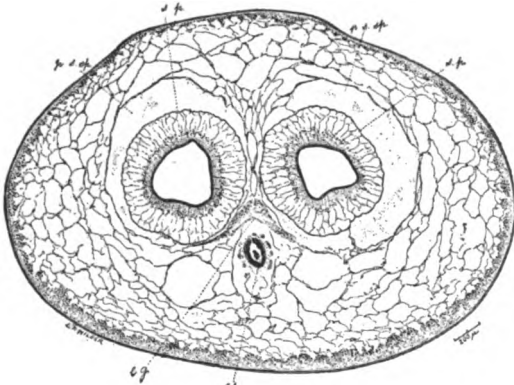


FIG. 145.

appearance of poorly preserved nuclei; some seem to be solid, others appear to be hollow, with a peripheral row of dots; in some fields they remind the observer very strongly of cross-sections of longitudinal muscles, and it seems probable that they are such, for the terminal sections of the pouch show distinct fibers apparently corre-

sponding to these structures. Immediately external to this layer is found a thin layer of circular muscles.

The portion of the sucker caudad of the isthmus, together with the two pouches, lies in a cavity which reminds the observer strongly of a rudimentary body cavity. From the dorsal and the ventral surfaces of the sucker a line of tissue, reminding the observer of a mesenterium, extends dorsad and ventrad to the body parenchyma, thus holding these structures in place; similar mesenterium-like bands connect the pouches with the somatic parenchyma (figs. 142-145); at their insertion, these bands spread around the sucker and pouches like a peritoneum; the esophagus runs in the ventral mesentery band, which also contains the esophageal ganglion.

Whether the cavities in question actually represent a rudimentary body cavity is a question which may be left open, but such an interpretation is rather tempting. Similar cavities are found or at least strongly indicated in *Homologaster philippinensis* (see Stiles and Goldberger, 1908a, figs. 34-36) *Watsonius watsoni*, and in other Paramphis-

tomidæ. The lumen of the sucker differs in form in the different portions of the suctorial tract; that of the oral portion is somewhat spindle-shaped, while that of the esophageal portion is a transverse slit, slightly crescentic in both transverse and sagittal sections with the convexity directed dorsad. In about the equatorial plane of this portion of the sucker a shallow, transverse, slit-like diverticulum of the suctorial lumen is formed in the dorsal muscular wall, so that the lumen of the sucker in sagittal plane at this point presents a triradiate form (fig. 140); in transverse section at this point the impression obtained is that of a transverse tongue-like ridge or partition projecting upward into the lumen of the sucker (fig. 142). Caudad of this level the horns of the crescentic lumen seen in transverse section rapidly shift and assume a more or less direct dorso-

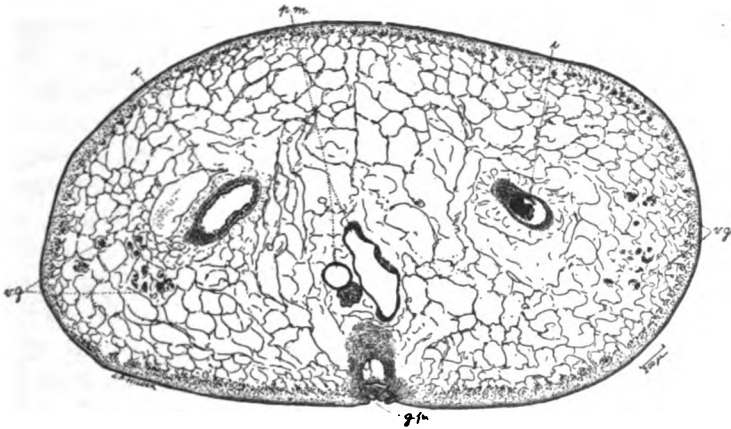


FIG. 146.

ventral direction and form the dorso-ventral slit-like lumen of the bulbs so that in a section, say, at the level of origin of the esophagus, the lumen of the sucker and bulbs combined has a broad H-shape (fig. 143). The caudo-dorsal extremity of the slit-like lumen of the bulbs leads into the irregular lumen of the pouches (fig. 144). The sucker, bulbs, and pouches are lined throughout with a cuticle in anatomical continuation with that of the body surface. That of the second portion of the sucker and of its bulbs is provided with minute irregularly scattered conical papillæ. The esophagus (figs. 139, 140, 143, 145) springs from the base of the sucker in the space between the downward projections of the bulbs.

From this point it passes caudad, describing a slight curve ventrad, to a point but very little less than one-third of the body length from the oral extremity, slightly nearer the venter than the dorsum and about equidistant from the lateral margins, where it terminates, giving origin to the intestinal ceca. This terminal portion is some-

what expanded, and its musculature distinctly though not very greatly increased in thickness. The musculature of the esophagus consists of 2 layers, an internal of circular and an external of longitudinal fibers. The increase in thickness of the muscle wall of the caudal portion of the esophagus takes place gradually, and is due mainly to an increase in thickness of the internal circular layer. The intestinal tubes leave the latero-dorso-caudal aspect of the slightly-expanded caudal extremity of the esophagus and curve downward (caudad) and outward (laterad) and slightly dorsad, forming a transverse arch in the first part of their course. They terminate by blind extremities in the caudal portion of the body, the left at a very slightly higher level than the right, and both slightly caudad of a transverse plane through the equator of the acetabulum and about midway between the latero-dorsal aspect of the latter and the corresponding aspect of the body surface of the worm (figs. 139,

140, 151). In their course caudad the intestinal ceca describe an undulating path. The undulations are of moderate amplitude, directed from front (venter) to back (dorsum) and maintain about an equal distance from the latero-dorsal, curved surface of the worm.

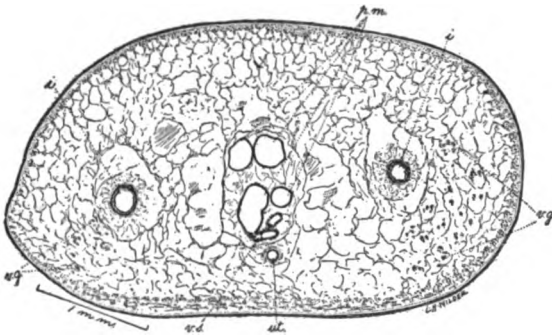


FIG. 147.

The ceca approach nearest the dorso-median longitudinal line in the testicular zone, and reach a position dorsad of the caudal portions of the corresponding testis. The diameter of the intestines varies somewhat in different portions, and although they are, in a general way, cylindrical tubes, yet they are compressed here and there in one diameter or another, so that in transverse sections they present quite a variable outline. The lumen of the esophagus is lined with a cuticular layer in anatomical continuation with that of the sucker, but apparently somewhat thicker than that of the latter. This lining ceases abruptly at the beginning of the intestinal ceca, which are lined throughout with an epithelial cell layer.

GENITAL SYSTEM.—The male and the female genital organs, with the exception of the vitellogene glands, are disposed in the median field bounded laterally by the intestinal ceca.

Male organs.—This worm is provided with 2 fairly large lobulated (cauliflower-like) testes (fig. 148). They are placed one on each side of and close to the median sagittal plane in the same zone, slightly

nearer the caudal than the oral extremity and decidedly nearer the venter than the dorsum. There is but slight if any difference in the size of the two organs. Such difference as may exist is in favor of the left.

From the dorsal aspect of each testis there emerges a vas efferens (fig. 148), which is directed at first slightly cephalo-mediad, then more directly mediad to unite with its fellow at a point in about the median sagittal plane, slightly nearer the caudal than the oral extremity, and considerably nearer the dorsum than the venter, to form the vas deferens. The first portion of the vas is an intricately coiled thin walled moderately-dilated duct or vesicula seminalis. At a point which may be clearly distinguished (fig. 147) the thin walled vesicula gives place to a relatively thick (15μ) muscular walled canal (pars muscosa) of considerable caliber (150μ), which is much less

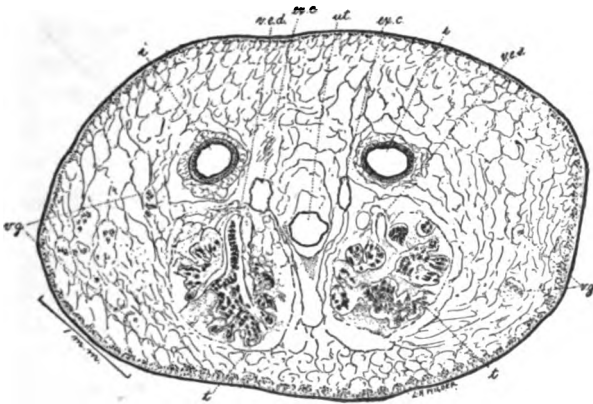


FIG. 148.

intricately coiled, so that its longitudinal windings may be followed in transverse sections. A valve-like constriction of the lumen marks the change from vesicula to pars muscosa. The windings of these two portions of the vas deferens form a fairly compact mass, which lies in the axial region of the body between and cephalo-dorsad of the testes, and longitudinally between the equatorial plane and a transverse plane slightly cephalad of the genital pore. The terminal portion of the vas deferens is relatively quite short, and, like that of the pars muscosa, its beginning is clearly and sharply marked by a change in the character of the wall, which becomes thin and surrounded by glandular cells, which are relatively few in number, and by a valve-like constriction of the lumen. This portion of the vas deferens, which by analogy may be called the pars prostatica, is in the form of a small vesicle dorsal of the genital pore. From its ventral aspect there passes ventrad a short muscular duct (ductus ejaculatorius), which unites with the metraterm to form a ductus her-

maphroditicus. The latter, a short delicate canal, opens into a small chamber, which in its turn opens into a slit-like genital atrium (fig. 140).

Female organs.—In the axial region of the body, a little to the left of the median line, between two transverse planes, one of which is

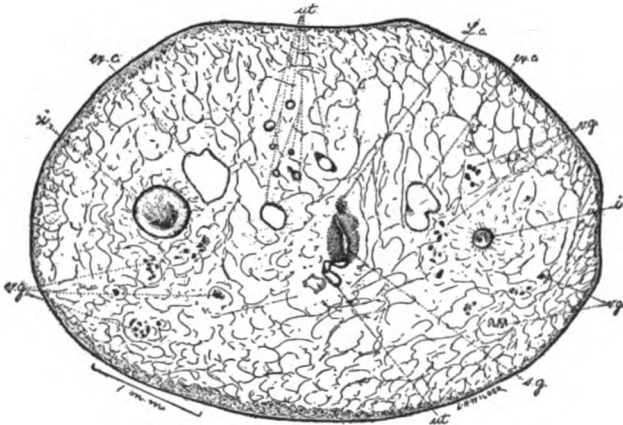


FIG. 140.

just caudad of the caudal plane of the testes and the other just cephalad of the upper margin of the acetabulum, are the ovary and shell gland, the former just above (cephalad) and slightly to the left of the latter. From the dorso-caudal aspect of the ovary there

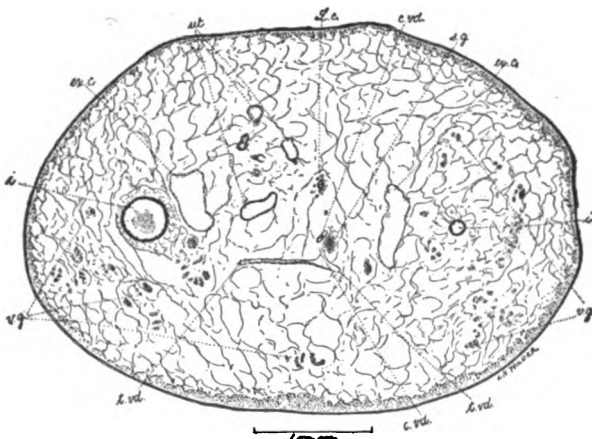
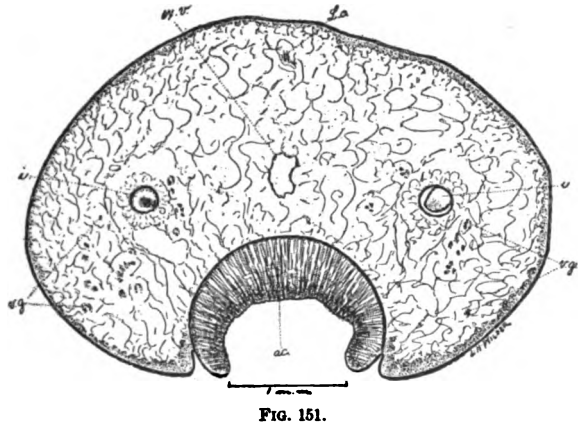


FIG. 150.

springs the oviduct, which turns caudad as it passes to the dorsal aspect of the shell gland at the superior margin of which it divides into two branches, one of which curves slightly to the right to penetrate the dorsal aspect of the shell gland, in the substance of which it is joined by the vitello-duct to form the ootype. The shell gland is con-

siderably smaller than the ovary, immediately caudad of which it lies. It is penetrated by the vitello-duct and, as just described, by the oviduct on its caudo-dorsal aspect. These two ducts unite to form a fusiform ootype (fig. 149), which is directed dorso-ventrally and is continued as the uterus, the latter emerging from the ventral aspect of the gland. The uterus, after emerging from the shell gland, curves to the right, then dorsad, and describes some coils in the axial region of the body to the right and dorsad of the shell gland and ovary, as it winds its way cephalad. At about the level of the superior aspect of the ovary it passes obliquely cephalo-ventrad to reach the ventral aspect of the coiled vas deferens. From this point onward its course is but slightly wavy, maintaining throughout its relation to the vas deferens as it passes at first directly cephalad, then gradually tilts ventrad, uniting with the ductus ejaculatorius at about the level and a short distance dorsad of the genital pore. The second of the two ducts into which the oviduct has been described as branching at the level of the superior margin of the shell gland is Laurer's canal (fig. 140). This canal passes caudo-dorsad to open in the middle line of the dorsal surface, a little caudad of the level of the upper margin of the acetabulum. The vitellogene glands, consisting of well-developed follicles, occupy the lateral regions of the body, external to the intestinal ceca, and extend from about the level of the plane of the base of the esophageal pouches to or slightly caudad of the plane of the cecal extremities of the intestines. At about the level of the shell gland a duct leaves each of the vitellogene glands and passes transversely inward ventrally of the ceca, the two uniting at the level of and close to the ventro-caudal margin of the shell gland (fig. 150). From their point of junction a duct passes dorsad, skirting the caudo-mesial margin of the shell gland and penetrating the latter at its caudo-dorsal aspect.



EXCRETORY SYSTEM.—This is highly developed. Two large and several small excretory canals enter the cephalic aspect of the excretory vesicle, which lies in the caudal portion of the axial region of the body dorsad of the acetabulum (figs. 140, 151). The vesicle is

an elongate sack, the lumen of which as it extends caudad gradually becomes reduced in caliber, finally becoming a narrow canal, the terminal portion of which is lined with a cuticle in anatomical continuation with that of the surface. This terminal portion or excretory duct opens in the middle line of the dorsal surface only a little above the caudal margin of the worm and at a considerable distance caudad of the opening of Laurer's canal.

ILLUSTRATIONS.

FIG. 137.—Ventral view of *Ps. stanleyii*. Enlarged. Original.

FIG. 138.—Profile view of same. Enlarged. Original.

FIG. 139.—Frontal projection. Shows oral sucker (*o. s.*), suctorial bulbs (*s. b.*), suctorial pouches (*s. p.*), esophagus (*es.*), intestines (*i.*), testes (*t.*), vasa efferentia (*v. e.*), ovary (*ov.*), shell gland (*s. g.*), uterus (*ut.*), position of genital pore (*g. p.*), and acetabulum (*ac.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, *h-h*, *j-j*, *k-k*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 140.—Profile projection. Shows oral sucker (*o. s.*), suctorial bulb (*s. b.*), suctorial pouches (*s. p.*), esophagus (*es.*), intestines (*i.*), right testis (*t.*), right vas efferens (*v. e.*), vas deferens (*v. d.*), ovary (*ov.*), shell gland (*s. g.*), uterus (*ut.*), oviduct (*ov. d.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), and genital atrium (*g. a.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, *h-h*, *j-j*, *k-k*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 141.—Transverse section at *a-a* figs. 139 and 140. Shows form of body, surface papillæ (*s. pap.*) and oral sucker (*o. s.*). Enlarged. Original.

FIG. 142.—Transverse section at *b-b* figs. 139 and 140. Shows form of body, form of esophageal portion of sucker (*o. s.*), perisuctorial space (*p. s. sp.*), and dorsal and ventral mesenterium-like bands (*m. b.*). Enlarged. Original.

FIG. 143.—Transverse section at beginning of esophagus through plane at *c-c* figs. 139 and 140. Shows form of body, form of oral sucker (*o. s.*), H-shaped form of suctorial lumen, perisuctorial space (*p. s. sp.*), and dorsal and ventral bands (*m. b.*). Enlarged. Original.

FIG. 144.—Transverse section through plane *d-d* figs. 139 and 140. Shows form of body, esophagus (*es.*), extension of lumen of suctorial bulb (*s. b.*) into suctorial pouch (*s. p.*), and caudal extension of perisuctorial space (*p. s. sp.*), which is filled with a granular coagulum. Enlarged. Original.

FIG. 145.—Transverse section through plane *e-e* figs. 139 and 140. Shows position and relations of suctorial pouches (*s. p.*) to esophagus (*es.*), the esophageal ganglion (*e. g.*), and the caudal extensions of the perisuctorial space (*p. s. sp.*), which contains some granular coagulum. Enlarged. Original.

FIG. 146.—Transverse section through plane at *f-f* figs. 139 and 140. Shows genital pore (*g. p.*), pars muscosa (*p. m.*), the intestinal ceca (*i.*), and the vitellaria (*v. g.*). Enlarged. Original.

FIG. 147.—Transverse section through plane *g-g* figs. 139 and 140. Shows position and relations of intestines (*i.*), pars muscosa (*p. m.*), the valve-like junction of the vesicula seminalis (*v. s.*) with the pars muscosa, the uterus (*ut.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 148.—Transverse section through plane *h-h* figs. 139 and 140. Shows position and relations of the testes (*t.*), the point of origin of the right (*v. e. d.*) and the left (*v. e. s.*) vas efferens, uterus (*ut.*), intestinal ceca (*i.*), vitellaria (*v. g.*), and excretory canals (*ex. c.*). Enlarged. Original.

FIG. 149.—Transverse section through plane *i-i* figs. 139 and 140. Shows position and relations of shell gland (*s. g.*), Laurer's canal (*L. c.*), uterus (*ut.*), intestines (*i.*), vitellaria (*v. g.*), and excretory canals (*ex. c.*). Enlarged. Original.

FIG. 150.—Transverse section through plane *k-k* figs. 139 and 140. Shows position and relations of transverse vitello-ducts (*t. vd.*), the common vitello-duct (*c. vd.*), base of shell gland (*s. g.*), Laurer's canal (*L. c.*), the uterus (*ut.*), vitellaria (*v. g.*), intestinal ceca (*i.*), and excretory canals (*ex. c.*). Enlarged. Original.

FIG. 151.—Transverse section at plane *l-l* figs. 139 and 140. Shows position and relations of Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), vitellaria (*v. g.*), intestines (*i.*), and acetabulum (*ac.*), with its projecting rim. Enlarged. Original.

PSEUDODISCUS COLLINSII (Cobbold, 1875) Stiles & Goldberger, 1910.

[Figs. 152 to 162.]

1875: *Amphist. collinsii* Cobbold, 1875l, 741 (in *Equus caballus*; Simla, India); 1875n, 818, 819; 1879b, 357, 359; 1883x, 515.—Fischæder, 1903h, 489 to *Pseudodiscus* by Sonsino.—Huber, 1896a, 580 (India).—Sonsino, 1895, 182, fig. 2; 1895, 4-5, fig. 2.—Theobald, 1900, 51.

1895: *Amphist. (Pseudodiscus) collinsii* (Cobbold, 1875) Sonsino, 1895, 182, 187; fig. 2; 1895, 9, fig. 2.

1895: *Amphist. collinsii* Ward, 1895, 338 (in *Equus caballus*).—Fischæder, 1902a, 48 (*E. c.*; India); 1903h, 631, 632.

SPECIFIC DIAGNOSIS.—*Pseudodiscus* (p. 170): Body 5 to 5.76 mm. long by 3.5 to 4 mm. broad; brick red (fresh) or flesh tint (alcohol specimens); oval, cephalic extremity somewhat blunted, caudal extremity very broadly rounded, nearly semicircular, lateral margins convex, greatest diameter slightly caudad of equator, about in testicular zone; cephalic extremity bears minute, slender, conical papillæ. Genital pore ventro-median about nine twenty-thirds of length from anterior end, in cephalic portion of equatorial third, postbifurcal, halfway between oral margin and cephalic margin of acetabulum. Acetabulum ventro-subterminal, 1.58 mm. broad, 1.1 mm. long, aperture 0.5 to 0.7 mm. in diameter, surrounded by very prominently raised margin; cavity relatively deep. Mouth terminal; oral sucker constricted at equator into a globular oral and a bilobous esophageal portion; each

lateral bulb connects with a large globular pouch; these pouches and a portion of the sucker lie in cavities strongly suggestive of a rudimentary body cavity, but they are connected with the body wall by dorso-ventral mesenterium-like bands; esophagus arises from base between bulbs and extends about to border between cephalic and equatorial thirds of body; ceca long, extend about to equator of acetabulum, each forming in its course two strongly convex lines latero-dorsad, which come together near caudal margin of testis. Excretory pore medio-terminal, caudal of acetabulum; excretory vesicle well developed, dorsal of acetabulum.

Male organs: Testes rather small, somewhat globular and cauliflower like, ventral, equatorial, slightly nearer median line than corresponding lateral margins; zones nearly coincide, fields separate; vasa efferentia spring from dorso-median aspect, run dorso-mediad, unite about in equator in median line to form vas deferens; vesicula seminalis and pars muscosa compactly coiled in median field, extending very slightly cephalad of genital pore; pars prostatica short; ductus ejaculatorius very short, opens above metraterm into an atrium; the latter appears to communicate with a slit-like atrium from which a slender ductus hermaphroditicus extends ventrad to open on vertex of the small genital papilla; cirrus pouch absent.

Female organs: Ovary and shell gland submedian, posttesticular, preacetabular, nearer acetabulum than testes, ovary cephalad of shell gland; vitellaria, with sparsely scattered follicles, lateral of ceca, extending from equatorial plane of esophagus to plane of caudal end of ceca; vitello-ducts pass ventrally of ceca; uterus forms coils dorso-medio-lateral of ovary, and from a point about on the cephalic plane of the ovary it passes ventro-cephalad in a somewhat wavy course, crossing ventrally of the vasa efferentia, and eventually the metraterm opens into a slit-like atrium into which the ductus ejaculatorius also discharges; Laurer's canal from its origin (dorsally of shell gland) runs dorsally of excretory vesicle caudo-dorsad to dorso-median line, over equator of acetabulum, its pore being some distance cephalad of excretory pore.

Eggs: Not observed.

TYPE.—U.S.N.M. (Coll. Hassall) 5778 (C in sections); cotypes U.S.N.M. (Coll. Stiles) 5266, and U.S.B.A.I. 1720; all from Cobbold's original material.

HOST.—The horse (*Equus caballus*; India).

SOURCE OF MATERIAL.—The material, consisting of six specimens in all, was obtained from bottles as follows: U.S.N.M. (Coll. Stiles) No. 5266, containing 1 specimen; U.S.N.M. (Coll. Hassall) No. 5778, containing 4 specimens; U.S.B.A.I. No. 1720, containing 1 specimen.

These specimens represent part of Cobbold's original material, presented by him to Hassall in 1882. The worms were collected from *Equus caballus* in India.

HISTORICAL REVIEW.—Cobbold (1875, 741) quotes from a letter from Collins, dated Simla, as follows:

I forward you by this mail parasites found in the colon of a horse that died a subject of fever peculiar to this country. There were about a thousand of the parasites, and nearly the whole of them were situated close to the cæcum, and were loose in the gut. Not having seen parasites at all similar to these, I have taken the liberty to forward them for identification.

Cobbold states that the worms are considerably smaller than are *Amphist. hawkesii* from the elephant, and he names the worm *A. collinsii*. In a later paper (1875n, 818, 819) he refers to them again very briefly and gives the colon as the habitat.

Ward (1895, 338) merely mentions the worm, with *Am stanleyi* as synonym, in a list of the parasites of the horse.

Sonsino (1895, 4-5, fig. 2) gives the size as 7 mm. long by 5 broad, figures the worm, and, referring to its similarity to *Am hawkesii*, places it in his new genus *Pseudodiscus*.

Huber (1896a, 580) simply states that this species "which occurs on horses, is also said to give rise to fatal disease in India."

Fischæder (1901a, 48) merely cites this form as a species inquirenda, gives the measurements as 7 mm. long by 3 mm. broad, and states that it occurs in the colon of *Equus caballus* in India.

EXTERNAL CHARACTERS.

SIZE.—The 6 specimens preserved in alcohol-glycerine varied from 5 to 5.76 mm. in extreme length and from 3.5 to 4 mm. in greatest width.

COLOR.—The worms are of a flesh tint.

FORM.—The specimens are not in very good state of preservation and are contracted in various ways, so that all specimens are not uniform; on this account it is somewhat difficult to give an accurate description of the outline. In general, however, it may be said to be oval, with a somewhat blunted oral and a broadly rounded caudal extremity; it bears quite a resemblance to *Ps. stanleyi*, but the sides appear more uniformly convex, the cephalic end seems to have less tendency to be pointed, and the caudal extremity seems to be relatively blunt (figs. 152, 153).

SURFACE.—At the oral pole the surface is beset by minute, slender, conical papillae. They resemble those on *Ps. stanleyi* but are more minute. Around the oral aperture, concentric with it, are a number of concentric shallow grooves; the one nearest the margin appears rather prominent and is set off by a narrow circular zone about the

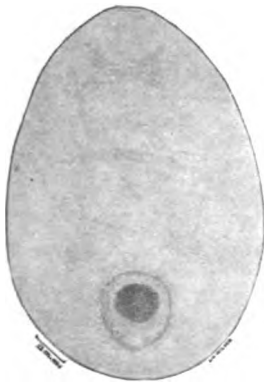


FIG. 153.



FIG. 152.

In some of the specimens there were noted fine transverse lines on the ventral surface. The dorsal surface is irregularly grooved, probably the result in part of irregular contraction of the body and in part, perhaps, the result of the action of the fixative preservative.

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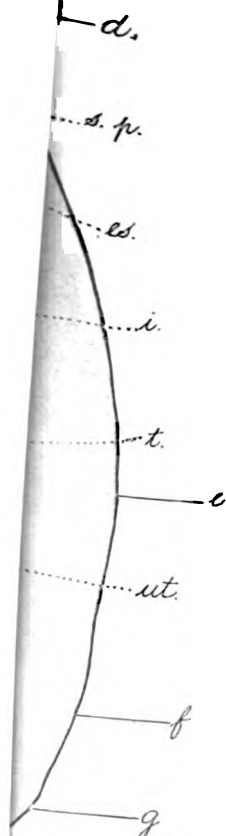
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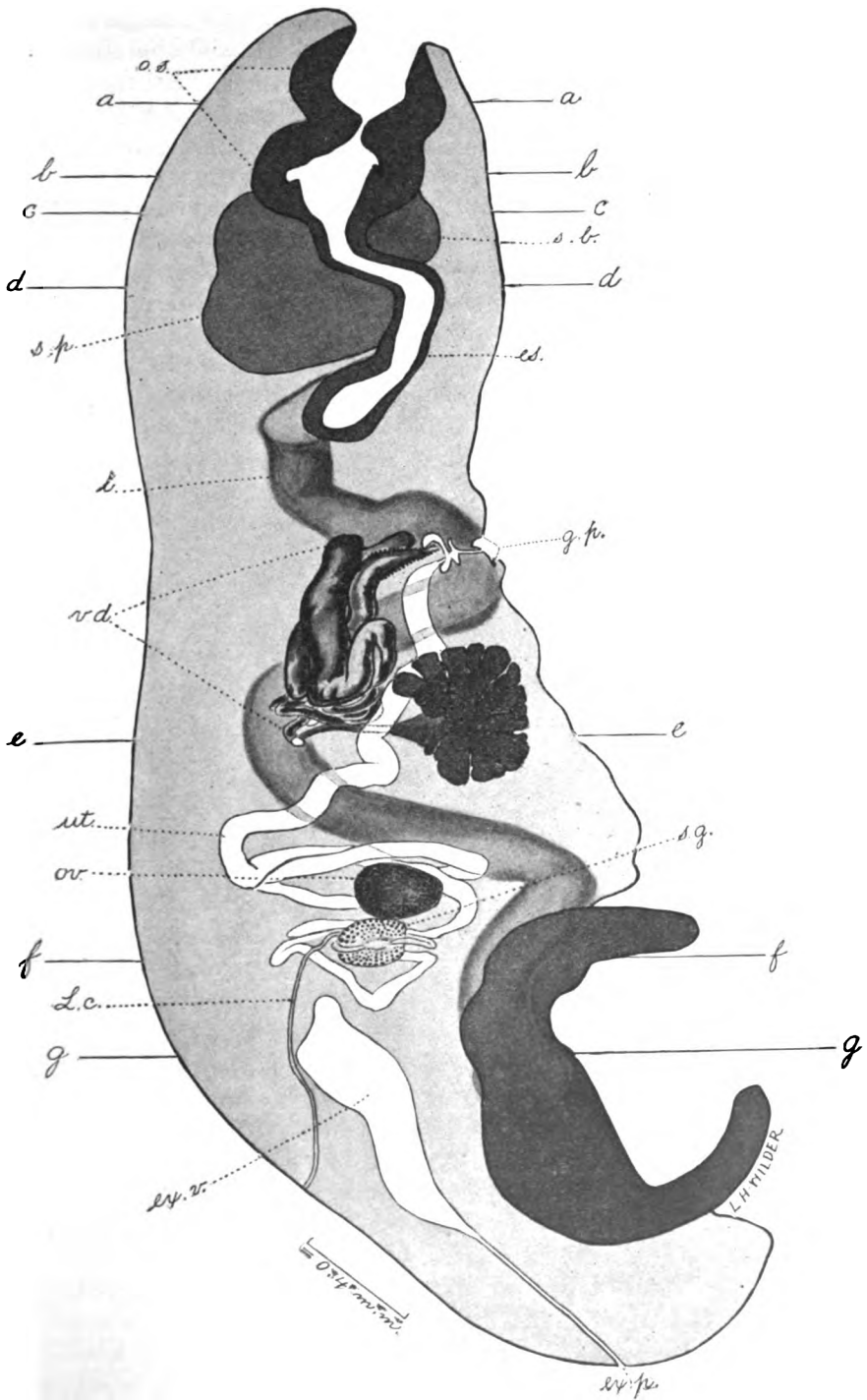


FIG. 155.

Genital pore.—On the ventral surface in the median longitudinal line and about midway between the oral margin and the anterior margin of the acetabular aperture is the genital pore. In one specimen this was at the vertex of a small circular bulging of the venter and, with the genital papillæ (apparently) filling it, suggested the form of an umbilicated smallpox vesicle.

Acetabulum.—The acetabulum, measuring 1.58 mm. in transverse and 1.1 mm. in longitudinal diameter, is in the caudal portion of the body, its aperture being ventro-subterminal and measuring 0.5 to 0.73 mm. in diameter. Encircling the aperture there is a prominent ring marked off from the general surface by a deep circular groove (figs. 152, 153, 161, 162). This projecting ring is seen in sections to be a portion of the acetabulum. The acetabulum is relatively much larger in this than in *Ps. stanleyii*, and its cavity is deeper.

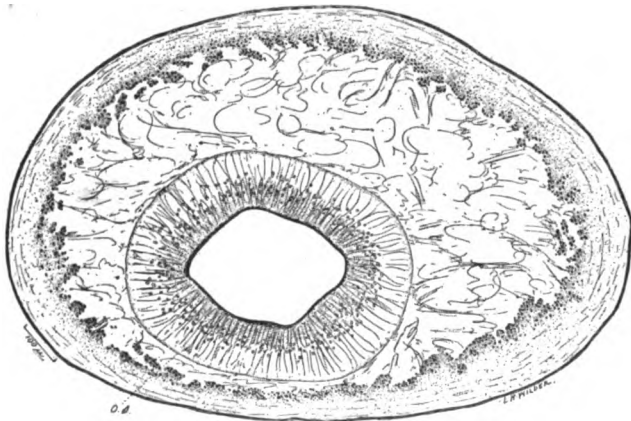


FIG. 156.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The cephalic extremity is pierced by a more or less circular aperture which measured 0.41 mm. and 0.36 mm., respectively, in 2 specimens. This oral aperture leads directly into a muscular sucker. As in the case of *Ps. stanleyii* the sucker may be divided for purposes of description into 2 portions, which are marked off by a constriction (or isthmus) at about its equator. The first or oral portion is of a somewhat globular form and measures 0.64 mm. in transverse and 0.52 mm. in dorso-ventral diameter; its lumen is of relatively considerable diameter, both transversely and ventro-dorsally (fig. 156). Corresponding to the region of constriction referred to as the dividing line between the two portions of the sucker the lumen becomes a transverse slit and leads into the second, esophageal (or bulbous), portion of the sucker. This portion broadens

out and, on each side of the origin of the esophagus, it extends caudad for a short distance of about 0.24 mm. in the form of a muscular bulb (figs. 154, 155). This portion of the sucker measures about 0.52 mm. in greatest dorso-ventral diameter, which is at about the equator of this portion of the sucker, and about 1 mm. in transverse diameter measured at the level of origin of the esophagus. Compared with the corresponding portion of the sucker of *Ps. stanleyi* this is relatively much larger in *Ps. collinsii*. From the ventral and from the dorsal wall of this portion of the sucker a transverse muscular ridge projects into the lumen of the sucker (figs. 155, 157) in a manner which strongly suggests the relation between the pharynx and oral sucker in *Fasciola hepatica*. The lateral projecting edges of these ridges serve as inner (median) boundaries of the dorso-ventrally-running slit-like lumen of the suctorial bulbs (fig. 158). In transverse section just above the level of origin of the esophagus the relation of the

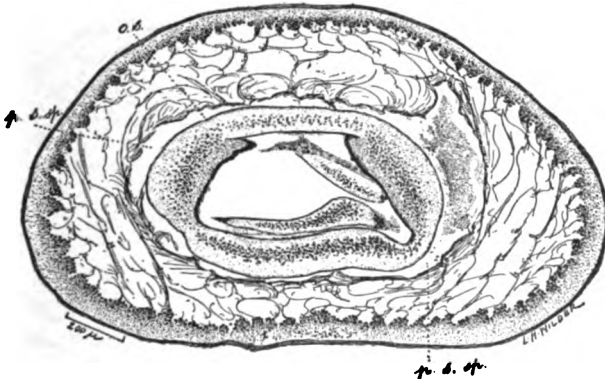


FIG. 157.

lumen of the sucker to that of its bulbs is such that combined they form a broad letter H (fig. 158).

From the dorso-caudal aspect of the lateral suctorial prolongations or bulbs there springs on each side a pouch. These pouches are roughly globular in form, of relatively considerable dimensions. The right is a little larger than the left. They are in relation to the latero-dorsal aspects of the esophagus (fig. 159) and extend caudad to about the level at which the latter gives origin to the intestinal ceca. The pouches are sharply delimited by a cavity from the surrounding body parenchyma. Their walls consist of cells which, though large and resembling those of the body parenchyma, are much smaller than those of the latter. A considerable portion of the sucker, together with the bulbs, lies in a cavity strongly suggestive of a rudimentary body cavity and similar to the condition described for *Ps. stanleyi*; mesenterium-like bands are found dor-

sally and ventrally extending from the body wall to the digestive apparatus in question. The upper limit of this cavity is as in *Ps. stanleyii* at the level of the suctorial isthmus. At or slightly above the level of origin of the esophagus this cavity becomes definitely divided into two (fig. 158), which inclose the bulbs and extend caudad to a point slightly below (caudad of) the corresponding caudal margin of the pouch. The cavity contains a granular mass (fig. 158) resembling if not identical with the granular material encountered here and there in the excretory canals. The lumen of the second portion of the sucker is transversely elongate, more or less contracted ventro-dorsally, and extends laterally into the lateral suctorial prolongations; in these the lumen, though still slit-like, is directed ventro-dorsally. In its turn this dorso-ventral slit-like lumen is continued from its dorsal extremity into the lateral pouches. The

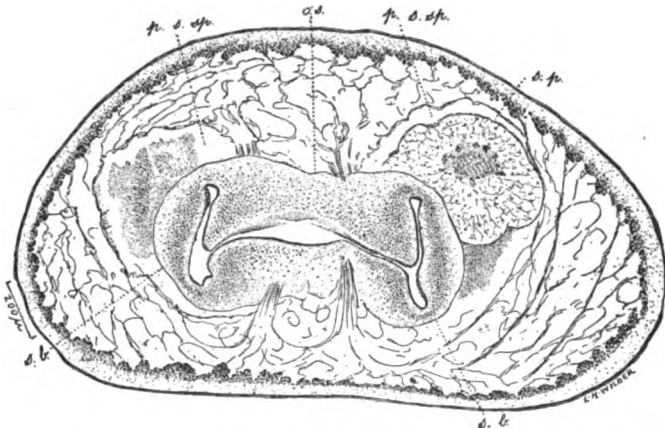


FIG. 158.

lumina of the latter are irregular in form and variable in the degree of distention, both in different specimens and at different levels in the same specimen. The esophagus leaving the sucker, as already described, passes caudad, describing in its course a slight curve, with convexity ventrad, and at about the junction of the first with the middle third of the body length it terminates, giving origin laterally to the intestinal ceca. The intestines, as simple tubes, pass at first dorso-laterad and at the same time slightly caudad to a point about one-fourth the width from the lateral margins, where they bend almost directly caudad, describing a wavy course both transversely and ventro-dorsally, similar to that in *Ps. stanleyii*, and terminate by cecal extremities laterally of the acetabulum at about the level of the lower margin of the aperture of the latter. In their course caudad they markedly approach the median line at one point, namely, dorsad of the corresponding testis.

The lumen of the digestive tract from the oral margin to the intestinal ceca is lined by a cuticle-like layer in anatomical continuation with that of the body surface. It is thickest in the esophagus. In the region of the mouth in the esophageal portion of the sucker and in that part lining the lumen of the lateral suctorial prolongations or bulbs it is beset by numerous small conical papillæ. These papillæ were not observed in any other portion of the sucker or in the suctorial pouches. The intestinal lumen is lined by an epithelial cell layer.

GENITAL SYSTEM.—As in *Ps. stanleyii*, the male and the female genital organs, except the vitellogene glands, are disposed in the median field, namely, between the intestinal ceca.

Male organs.—This worm is provided with two roughly globular, cauliflower-like (fig. 160) testes. They are disposed in one of the

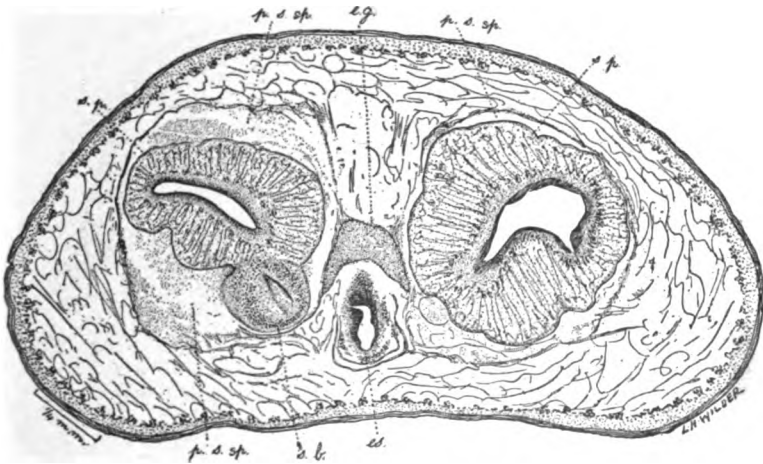


FIG. 159.

transverse diameters, (very) slightly (if at all) caudad of the equator of the worm. Each testis is a little nearer the median-sagittal plane than the corresponding lateral margin and much nearer the venter than the dorsum (figs. 154, 155, 160). From the dorso-median aspect of each testis there springs a duct, vas efferens, which passes more or less horizontally dorso-mediad, uniting with its fellow to form the vas deferens. The vas deferens is clearly differentiated into three portions, the first and second, vesicula and pars muscosa, being compactly coiled in the axial region of the body of the worm.

The vesicula is thin walled, but is not notably dilated; the muscosa, measuring about $112\ \mu$ in diameter, is provided with a relatively thick ($37\ \mu$) muscular wall; its terminal portion passes ventro-cephalad, and its wall becomes somewhat reduced in thickness as it passes into the third division (pars prostatica) of the vas deferens.

The latter is distinguished, as in other forms of this group, by being inclosed in a mass of nucleated cells; the prostatica is short and maintains the direction assumed by the distal portion of the pars muscosa, coming into close relation to the dorsal aspect of the terminal portion of the uterus; the prostatic cells cease a little before the male duct ends; this terminal portion appears to be very short and corresponds to the ductus ejaculatorius of the other forms. The ductus ejaculatorius appears to open just above the metraterm on the vertex of what may be regarded as a papilla forming the dorsal wall of a curved slit-like atrium. This atrium appears to communicate (?) with a smaller slit-like space immediately ventrad of it, from which there passes a slender duct, interpreted as the ductus hermaphroditicus, that opens on the vertex of a small genital papilla. The ductus hermaphroditicus, the two slit-like atria, the ductus ejaculatorius,

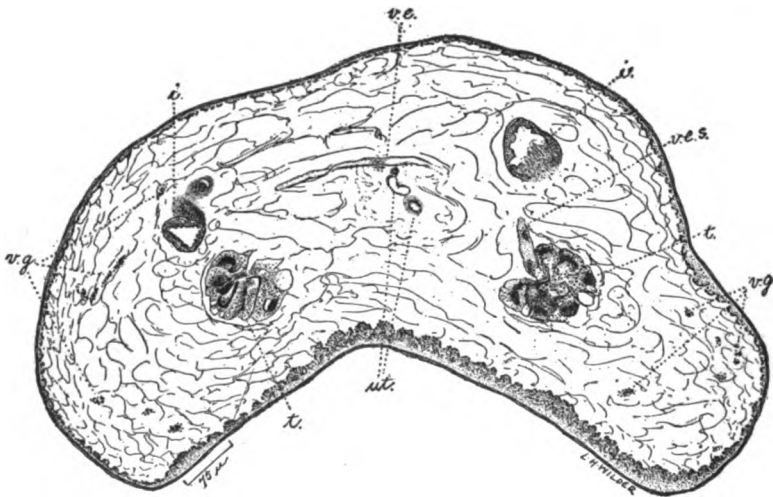


FIG. 160.

and metraterm are inclosed in a somewhat globular mass of muscular fibers.

This description of the termination of the male and female canals and of the ductus hermaphroditicus is tentative, as it is based only on transverse sections of poorly preserved material, which are of difficult and doubtful interpretation.

Female organs.—In the posttesticular axial region of the body, but a little to the right of the median line and just above the upper margin of the acetabulum, is the ovary. Close to the caudo-mesial aspect of the latter is the slightly smaller shell gland (figs. 154, 155). The oviduct springs from the caudal aspect of the ovary and passes at first directly caudad for a very short distance, then it passes dorso-mesial and skirts the dorso-caudal aspect of the shell gland which it pene-

trates. Laurer's canal leaves the oviduct at a point just before the latter begins to skirt the shell gland; it passes caudo-dorsad, cephalad of the excretory vesicle, the dorsal aspect of which it gains, and ultimately it reaches the middle line of the dorsal surface at a point in a plane slightly cephalad of the equator of the acetabulum, and relatively some distance above the excretory pore. The vitellogene glands consist of sparsely scattered follicles in the lateral regions of the body (external to the intestinal ceca), appearing also ventrally and dorsally of the ceca. They extend longitudinally from the level of the middle of the esophagus to the level at which the intestinal tubes terminate. From each gland a duct passes transversely mediad in front of the corresponding intestine to unite with its fellow close to the ventro-caudal aspect of the shell gland. From their point of union

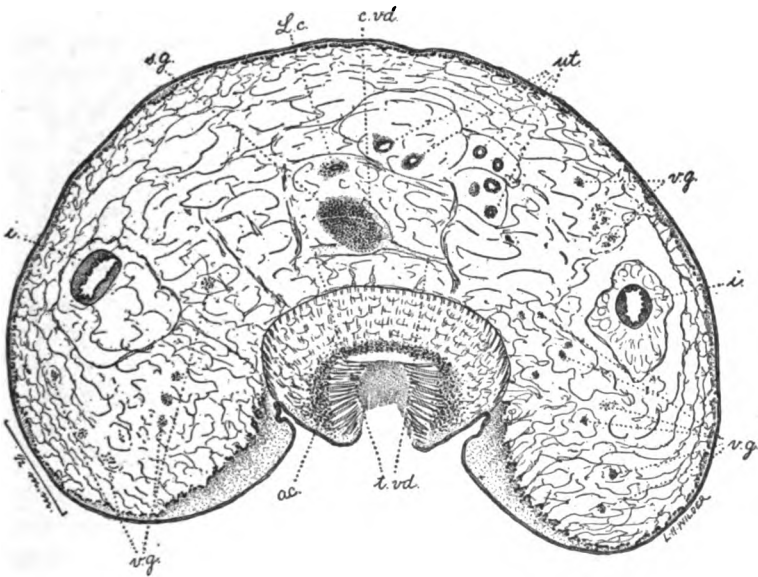


FIG. 161.

(fig. 161) a smaller duct originates and passes dorsad and a little to the right, skirting the corresponding aspect of the shell gland which it penetrates at its caudo-dorsal aspect a little to the left of the point of penetration of the oviduct. Within the gland the vitello-duct unites with the oviduct, the duct resulting from their union forming the ootype and continuing beyond as the uterus.

The uterus emerges from the ventral aspect of the shell gland, winds its way to the left, and then forms a number of coils in the axial body region to the left and dorsad of the ovary as it winds its way cephalad. Its windings cease at about the level of the cephalic aspect of the ovary; beyond this point the uterus pursues a direct, though slightly wavy, course ventro-cephalad to gain the ventral aspect of the coiled

vas deferens, passing beneath and ventrad of the arch of union of the vasa efferentia. In the remainder of its course the uterus retains this relation to the ventral aspect of the male duct and, as has been described, appears to open immediately below the latter into the slit-like atrium (fig. 155.)

EXCRETORY SYSTEM.—The excretory system appears well developed. The excretory vesicle is in the caudal portion of the body dorsally of the acetabulum (figs. 155, 162). It extends caudad to about the level of the caudal margin of the acetabulum. At this point its lumen becomes reduced to a duct, with a narrow lumen but strong wall, which passes directly caudad and opens in the median line of the dorsum almost if not quite at the caudal extremity of the worm.

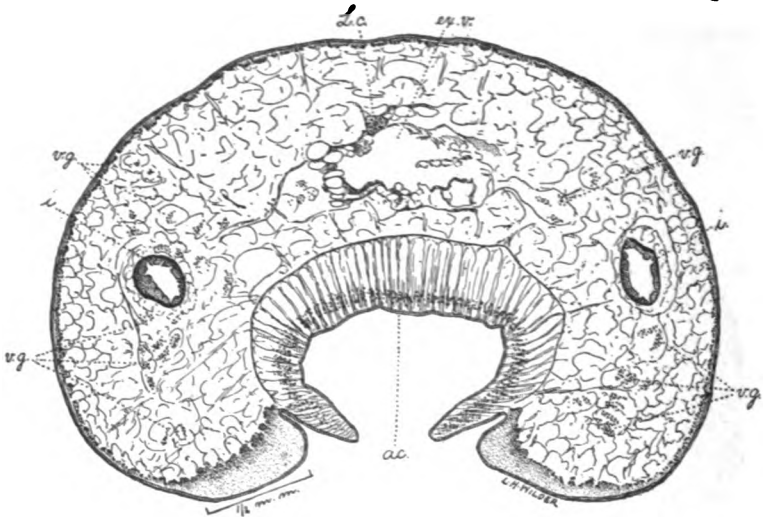


FIG. 162.

RELATION TO *Pseudodiscus stanleyii*.

Except for the difference in size, the two species are much alike in external appearance. A study of their internal anatomy brings out several points of difference. The esophageal portion of the sucker in *Ps. collinsii* is relatively much broader than that of *Ps. stanleyii*, and presents both a dorsal and a ventral transverse projecting ridge in its lumen; *Ps. stanleyii* presents a dorsal ridge only. The testes are actually and relatively much smaller in *Ps. collinsii* than in *Ps. stanleyii*, and furthermore they are more widely separated in *Ps. collinsii* than in *Ps. stanleyii*. The anatomy of the terminal portions of the genital canals appears to differ markedly in the two forms, though too much emphasis should not be placed on this because of the difficulty of interpretation of sections and of the limited and unsatisfactory nature of the material. The opening of Laurer's canal is much

farther caudad in *Ps. collinsii* than in *Ps. stanleyii*; in the former it is a little above the caudal margin of the acetabulum, whereas in the latter it is only a little below the upper margin of the acetabulum. The acetabulum of *Ps. collinsii* is relatively much larger than of *Ps. stanleyii*, and its cavity is deeper. The ovary and the shell gland are at about the level of the upper margin of the acetabulum in *Ps. collinsii*, but distinctly above this level and nearer the level of the caudal aspects of the testes in *Ps. stanleyii*.

ILLUSTRATIONS.

FIG. 152-153.—Ventral aspect showing some of the variations in outline.

FIG. 154.—Frontal projection from transverse sections of specimen shown in fig. 152. Shows oral sucker (*o. s.*), suctorial bulbs (*s. b.*), suctorial pouches (*s. p.*), esophagus (*es.*), intestines (*i.*), genital pore (*g. p.*), testes (*t.*), vasa efferentia (*v. e.*), uterus (*ut.*), ovary (*ov.*), shell gland (*s. g.*) and acetabulum (*ac.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 155.—Profile projection of specimen shown in fig. 152. Shows oral sucker (*o. s.*), left suctorial bulb (*s. b.*), suctorial pouch (*s. p.*), esophagus (*es.*), vas deferens (*v. d.*), uterus (*ut.*), ovary (*ov.*), shell gland (*s. g.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), and genital pore (*g. p.*). *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, *g-g*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 156.—Transverse section through plane *a-a* figs. 154 and 155. Shows form of body and form of oral sucker (*o. s.*). Enlarged. Original.

FIG. 157.—Transverse section through plane *b-b* figs. 154 and 155. Shows oral sucker (*o. s.*) with ventral and dorsal ridges projecting into its lumen, and perisuctorial space (*p. s. sp.*) containing some granular coagulum. Enlarged. Original.

FIG. 158.—Transverse section through plane *c-c* figs. 154 and 155. Shows H-shaped lumen of oral sucker (*o. s.*) and suctorial bulbs (*s. b.*), the superior margin of the left suctorial pouch (*s. p.*) and the perisuctorial space (*p. s. sp.*) containing some granular coagulum. Enlarged. Original.

FIG. 159.—Transverse section through plane *d-d* figs. 154 and 155. Shows esophagus (*es.*), esophageal ganglion (*e. g.*), caudal portion of right suctorial bulb (*s. b.*), suctorial pouches (*s. p.*), and caudal prolongations of perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 160.—Transverse section at plane *e-e* figs. 154 and 155. Shows position and relation of the testes (*t.*), intestinal ceca (*i.*), arch of union of vasa efferentia (*v. e.*), origin of left vas efferens (*v. e. s.*), the uterus (*ut.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 161.—Transverse section at plane *f-f* figs. 154 and 155. Shows position and relation of caudal margin of shell gland (*s. g.*), union of transverse vitello-duct (*t. vd.*), the common vitello-duct (*c. vd.*), Laurer's canal (*L. c.*), uterus (*ut.*), vitellaria (*v. g.*), intestines (*i.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 162.—Transverse section at plane *g-g* figs. 154 and 155. Shows position and relation of intestines (*i.*), excretory vesicle (*ex. v.*), Laurer's canal (*L. c.*), vitellaria (*v. g.*), and acetabulum (*ac.*) with its projecting rim. Enlarged. Original.

HAWKESIUS, new subgenus.

SUBGENERIC DIAGNOSIS.—*Pseudodiscus* (p. 170): Esophageal wall with pronounced muscular thickening in caudal half. Testicular zones separate, nearly or quite abut, fields coincide.

TYPE SPECIES.—*Pseudodiscus* (*Hawkesius*) *hawkesii*.

PSEUDODISCUS HAWKESII (Cobbold, 1875) Stiles & Goldberger, 1910.

[Figs. 163 to 174.]

1875: *Amphist. hawkesii* Cobbold, 1875n, 818, 819 (in *Elephas indicus*; India); 1877e, 234; 1879b, 393, 396, 399; 1882, 238–240, fig. 8; 1883x, 515.—Braun, 1893a, 874, 905; 1893d, 466 (*hawkesi*).—Fischder., 1902a, 48 (*hawkesi*) (in *E. indicus*; India); 1903h, 489 (to *Pseudodiscus* by Sons., 1895).—Galli-Valerio, 1901c, 364 (in elephant).—Huber, 1896a, 579–580 (in elephant).—Loos, 1902m, 439 (*hawkesi*).—Mégnin, 1882v, 455.—Piana & Stazzi, 1900a, 511, 519–525, 529, figs. 12–14 (*hawkesi*); 1901, 416.

1893: *Amphist. hawkesi* Braun, 1893d, 466 for *hawkesii*.

1895: *Amphist. hawkesi* Sonsino, 1895, 182 for *hawkesii*; 1895, 187, fig. to *Pseudodiscus*; 1896, 310.

1895: *Amphist. (Pseudodiscus) hawkesi* (Cobbold, 1875) Sonsino, 1895, 187 (9), fig. 1.

1895: *Amphist. (Pseudodiscus) hawkesi* Sonsino, 1895, 9, fig. 1.

1896: *Pseudodiscus hawkesi* (Cobbold, 1875) Sonsino, 1896, 310.—Piana & Stazzi, 1900, 519 to *Amphist.*

SPECIFIC DIAGNOSIS.—*Pseudodiscus* (p. 170): Body 3.5 to 5 mm. long by 2 to 3 mm. broad; light buff in color (alcohol material); oval, oral pole bluntly rounded, tilted slightly ventrad, caudal pole very bluntly rounded, almost semicircular; lateral margins convex in transverse section, straight to convex longitudinally, dorsum convex, venter flat to slightly concave longitudinally and transversely; oral pole with slender digitate papillæ. Genital pore ventro-median, postbifurcal, two-fifths of body length from oral margin with subhemispherical bulging. Acetabulum ventral at caudal end, oval to circular, 1.2 mm. in sagittal diameter, aperture 0.58 mm., dome 0.30 mm. thick; its margin projects and is separated from the body by circular groove; cavity rather shallow. Mouth subterminal; oral sucker constricted at equator into globular oral and a shorter broader esophageal portion; well-defined bulbs absent, but there are 2 large pouches which extend caudad about to equator of esophagus; esophageal portion of sucker and the pouches lie in a perisuctorial cavity; esophagus arises from base of sucker, extends to caudal margin of oral third of body; the anterior half of esophagus about 90μ thick, with wall 22μ thick, its caudal half increased enormously (up to 330μ) in diameter by increase of muscular tissue; ceca long, extend in wavy course to or slightly beyond equator of acetabulum; their course is wavy and at equator of animal they approach toward median line. Excretory pore at caudal extremity;

excretory vesicle dorsal of acetabulum, extends from near shell gland to postacetabular zone.

Male organs: Testes preacetabular in same longitudinal median field, with separate or slightly overlapping zones, deeply lobate but not of cauliflower type, noticed in *Ps. stanleyi*; vasa efferentia arise from dorsal aspect, extend cephalo-dorso-laterad, then cephalad, uniting about 120μ cephalad of cephalic testis to form vas deferens; vesicula much coiled, musculoosa coiled and well developed, prostatica and ejaculatorius short, the latter uniting with metraterm to form wide ductus hermaphroditicus, which discharges at genital pore; cirrus pouch absent.

Female organs: Ovary posttesticular, in testicular fields, in pre- and acetabular zone; shell gland postovarial; vitellaria, with small follicles, chiefly in extracecal area, apparently confined to cecal zone; uterus emerges ventrally from shell gland, passes in coils dorsad, caudad, then cephalad dorsally of ovary and testes, ventro-cephalad under arch of vasa efferentia, to ductus hermaphroditicus; Laurer's canal long, extends from oviduct caudo-dorsad, dorsally of excretory vesicle to dorso-median line, opening slightly cephalad of caudal margin of acetabulum, cephalad of excretory pore.

Eggs: Not observed.

TYPE.—Unknown.

HABITAT.—Colon of elephant (*Elephas indicus*), India.

SOURCE OF MATERIAL.—The material at our disposal, consisting of 11 specimens, was kindly sent to us by Prof. Pietro Stazzi, of Milan, Italy. The specimens are presumed to be some of those collected by Piana and Stazzi (1900) from the colon of an elephant.

HISTORICAL REVIEW.—Cobbold (1875l, 736) originally named this species without giving any anatomical details, but discussing its possible effects upon the host. The worms were collected from the elephant and sent to him from Secunderabad, India. They were named in honor of the sender. In his second paper (1875n, 818, 819) no details were added. Later Cobbold (1877e, 234) refers to having noticed some papillæ in the acetabulum of this species (but the question arises as to whether he did not perhaps have before him specimens of *Amphist. papillatum* from the same host). Still later (1879a, 393, 396, 399) Cobbold refers to the worms in connection with the habit of dirt-eating among elephants, and states that he had also found *hawkesii* in an elephant which died in England.

Mégnin (1882v, 455) states that Cobbold had admitted in a letter that *Amphist. hawkesii* and *A. ornatum* represent two varieties of the same species.

Cobbold (1882a, 224, 238–240, 241, fig. 8) gives *Amphist. collinsii* var. *stanleyi* as synonym of *hawkesii*, but states that he thinks that *stanleyi* will eventually prove to be a good species. He publishes the following specific diagnosis of *hawkesii*, which really represents the first attempt at a detailed zoological description:

Body of a pink color, smooth, plano-convex, finely wrinkled transversely, bluntly pointed and contracted in front, broadly rounded behind. Head surrounded by a few regular but not well-pronounced folds, armed with numerous small and extremely minute warty papillæ. Mouth terminal, circular. Ventral surface often slightly

depressed near the center, forming slight prominences on either side. Caudal sucker placed well forward, rather large, circular, with a broad lip and smooth concavity. Reproductive papilla small, situated nearly midway between the mouth and upper margin of the caudal sucker. Length, on the average, three-eighths of an inch; the longest specimen seven-sixteenths of an inch. Breadth one-fourth of an inch. Hab., large intestines of *Elephas indicus*.

Cobbold's figure 8 does not add any essential details.

Cobbold (1883x, 515) again refers to this species incidentally, but gives no further details. Neither are any additional data given by Braun (1893a, 874, 905; 1893d, 466), Huber (1896a, 579-580), Fischöder (1902a, 48; 1903h, 631), or Looss (1902m, 439), none of whom examined this species.

Sonsino (1895, 4) considers *hawkesii* as identical with *collinsii*, transfers the species to *Pseudodiscus*, and gives the following specific characters:

Color rosso carnicino come generalmente tutti gli Amfistomidi di mammiferi. 10 mm. by 6 mm. Corpo allungato, convesso pianeggiante, senza peduncolo distinto, con leggiere striscie trasverse e coll' estremo anteriore ristretto, ma ottuso e l' estremo posteriore arrotondato. Bocca terminale e circolare. Superficie ventrale spesso alquanto depresso verso il centro, dando così apparenza di superficiale escavazione, con due leggiere prominenze laterali corrispondenti probabilmente alle due masse testicolari. Ventosa posteriore subterminale, larga, circolare con margine grosso e con cavità liscia. Papilla genitale piccola a mezza distanza tra la bocca e il margine superiore della ventosa posteriore.

Later, Sonsino (1896, 310) merely mentions the worm.

Piana and Stazzi (1900, 520-525) described specimens of worms determined as *Amphistomum hawkesi* found in the colon of an elephant autopsied in Milan. Their diagnosis reads:

Corpo di color rosso carnicino, oblungo, convesso nel superficie dorsale ed escavato a doccia in quella ventrale. Estremità arrotondate, quella posteriore piu larga della anteriore. Lunghezza del corpo, in tutti gli individui esaminati, no superiore a 6 mm.; larghezza corrispondentemente al terzo anteriore del corpo 2.70 mm., corrispondentemente al terzo posteriore 3.70 mm. La superficie cuticolare, guardata con lente, appare irregolarmente striata nel senso trasversale. Sul margine della parte anteriore del corpo, alquanto verso la superficie ventrale, si trova la bocca oblunga in senso verticale circondata da una piccola ventosa del diametro di 0.18 mm., la quale è limita da un orlo della larghezza di 0.10 mm. Sulla superficie ventrale a livello del limite tra il terzo anteriore e il terzo mediano delle larghezza del corpo, si trova il poro genitale, in forma di un orifizio oblungo in senso trasversale, lungo 0.25 mm. e largo 0.15 mm. Sempre sulla superficie ventrale, alla distanza di 4.80 mm. della ventosa boccale, e quindi nella parte posteriore del corpo, si trova la ventosa posteriore, la quale è circondata da un orlo largo circa 0.17 mm. ed ha un orifizio del diametro di 0.40 mm.

Of the internal anatomy they recognized the "pharynx" (oral sucker), with a diverticulum each side, an esophagus 0.7 mm. long with posterior muscular thickening, and 2 long wavy ceca which end in the suckorial zone; the ovary and "vitellogene gland" [=shell gland] are located near the acetabulum; the uterus is flexuous and extends cephalad to the genital pore; dextral of the "female pore" there are seen structures indicative of the cirrus, vas deferens, and the 2 testes,

but they figure (fig. 14) 2 pairs of testes, 1 pair cephalad of the other, zones separate, fields coincide.

Piana and Stazzi point out that their specimens are smaller than Cobbold's, but explain this fact by assuming that they are dealing with young worms.

We accept the specific determination of their worms as *Amphist. hawkesii* on the principle that when an author claims to have identified a species his identification is to be assumed to be correct until proved to be incorrect. At the same time we may be permitted to recall the fact that recent work on trematodes has caused a great many surprises and it is not by any means excluded that if Cobbold's original specimens can be found, the material here accepted as *hawkesii* may eventually prove to be a distinct species.

In order to avoid a troublesome nomenclatural difficulty which frequently arises, and in regard to which authors are at present divided in opinion, we would state that should the original material of *hawkesii* prove to be distinct from the material here described, the subgenus *Hawkesius* is based upon the material now on hand, without any reference to characters which may or may not be present in the type of *hawkesii*. In other words, the species represented by U.S.P.H. & M. H.S. no. 10545 is the type of *Hawkesius*.



FIG. 163.

EXTERNAL CHARACTERS.

SIZE.—The alcohol-preserved specimens varied in length between 3.5 and 5 mm., and in greatest width between 2 and 3 mm.

COLOR.—The worms are of a light buff tint.

FORM.—The bottle in which the specimens were sent to us was found on arrival to be broken and the specimens dried out. They were put into 70 per cent. alcohol in which they regained to a considerable extent their original form, but they are still shrunken and deformed to a considerable degree (figs. 163, 164). They suggest *Ps. collinsii* in form, but appear more elongate and with the oral pole relatively more acutely pointed.



FIG. 164.

The dorsum is convex both longitudinally and from side to side; the venter is flat or slightly excavate in both the longitudinal and transverse directions, the concavity being best defined in the caudal half of the venter. The oral pole is bluntly rounded, presents a slightly bulbous appearance and is tilted to a variable degree ventrad. The caudal pole is broad and rounded from side to side. The lateral margins are convex in transverse section and straight or but slightly curved longitudinally.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The cephalic extremity is pierced by the mouth which is somewhat elliptical in form and directed dorso-ventrally. The aperture of the mouth leads directly into the oral sucker; this appears to be divided into two portions by a circular constriction at about its equator. The first or oral portion appears somewhat globular in form. The form of the second or esophageal portion can not be made out accurately from the material at our disposal. In a general way, however, it is shorter but broader than the oral portion. The increase in the transverse diameter is preparatory to the formation of lateral suctorial pouches which project caudad and laterad of the point of origin of the esophagus. They are irregularly globular in form and extend caudad on each side and dorsally of the esophagus (figs. 165, 167, 168) to about the equator of the latter. A well-defined suctorial bulb, such as was described for *Ps. collinsii* and *Ps. stanleyii*, is not present. The suctorial walls are muscular (figs. 166, 172), but the arrangement of the muscular bundles is less compact than in *Ps. collinsii*. The structure of the pouch wall (figs. 167, 168) is distinctly less muscular than that of that portion of the sucker from which the pouches project and the transition in structure from one to the

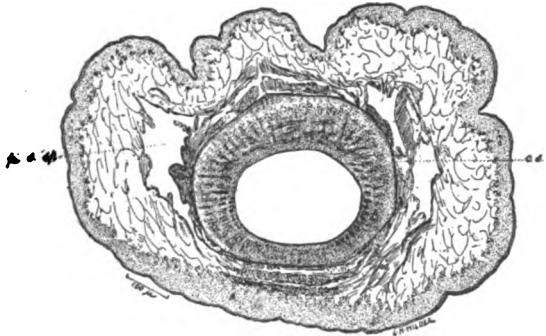


FIG. 166.

other can readily be made out. The cell structure of the pouch walls is loose but the cells are decidedly smaller than those of *Ps. collinsii*. The lumen of the sucker and pouches is lined by a thin cuticle-like layer. That of the second portion of the sucker is closely beset by small conical papillæ. A space around the caudal portion of the sucker and the pouches similar to that in *Ps. collinsii* is present (figs. 166, 167, 168). The esophagus springs from the ventral aspect of the base of the sucker. For about one-third its length it passes in a slightly wavy course caudad, then turns rather abruptly and passes directly dorso-caudad to a point in a transverse plane at about the junction of the first with the equatorial third of the body and about midway between venter and dorsum, where it gives off the intestinal ceca. The walls of the first portion of the esophagus measured in transverse sections of one specimen were about 22μ in thickness, the diameter of the esophagus at the same point being about 90μ . In the second portion of the esophagus the walls become greatly thickened

by the development of its muscular layers. In this portion three layers can readily be made out, an internal and an external of longitudinal, and a middle, very thick layer, of circular fibers (figs. 172, 173). This portion of the esophagus measured, in a sagittal section of one specimen, was 750μ long with a maximum dorso-ventral diameter of

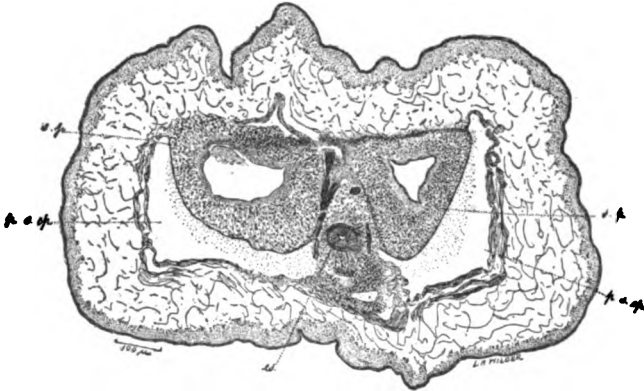


FIG. 167.

330μ and with a thickness of wall of between 90μ and 105μ . The esophagus is lined by a fairly thick cuticle-like layer.

The intestinal ceca pass laterad, at first almost at right angles with the esophagus, then describing a gentle curve they pass caudad

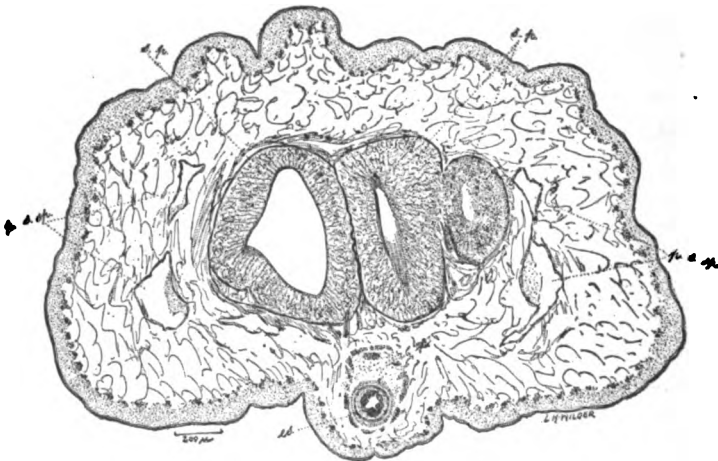


FIG. 168.

in a ventro-dorsal wavy course apparently similar to that in *Ps. collinsii* (fig. 174). At about the level of the equator of the animal the ceca approach close to the corresponding dorso-lateral aspect of the superior testis. This is also the point where in their course the intes-

tines come nearest together. A similar peculiarity has been noted in *Ps. collinsii* and *Ps. stanleyii*. The intestines extend caudad to or slightly beyond the equator of the acetabulum. In transverse sec-

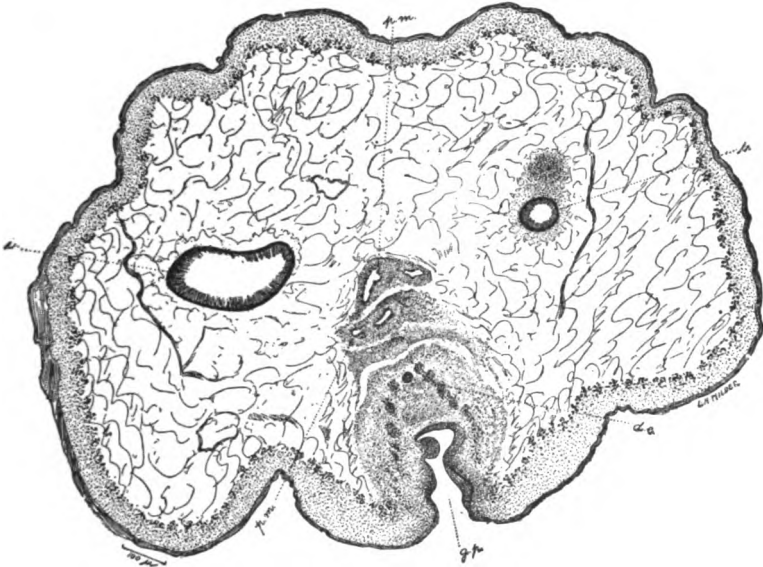


FIG. 160.

tions the ceca are irregularly circular in outline and are more or less constricted at irregular intervals, causing considerable variation in diameter. The lumen is lined by an epithelial cell layer.

GENITAL SYSTEM.—With the exception of the vitellogene glands the genital organs are disposed in the intercecal space.

Male organs.—

The two testes are in the axial region of the body, somewhat nearer the venter than the dorsum. They occupy about two-ninths of the body length in the zone immediately cephalad of the acetabulum.

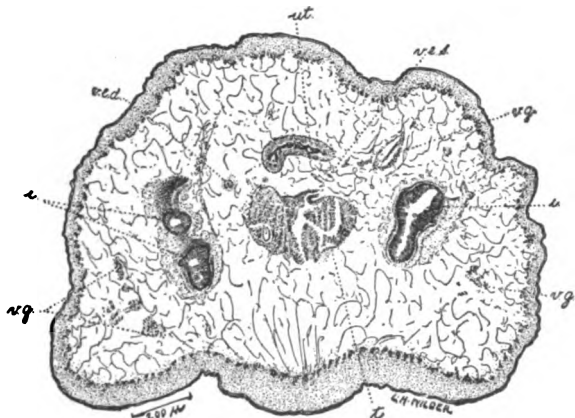


FIG. 170.

They are placed one directly caudad of the other, their zones either overlapping very slightly or separated by a very narrow interspace. The two testes are of about the same size; measured

from a series of transverse sections of one specimen the superior testis was 420μ long by 365μ wide by 210μ thick, while the caudal testis was 400μ long by 390μ wide by 180μ thick. Each testis is divided into numerous lobes by deep infoldings of its inclosing membrane. The testes are not quite of the cauliflower-type, such as those of *Ps. collinsii* and *Ps. stanleyii*. From the dorsal aspect of each testis there emerges a vas efferens (figs. 170, 171). After emerging from the testes the vasa efferentia tend cephalo-dorsad and away from the median line, the vas from the superior testis going to the left and that from the inferior (or caudal) to the right. After reaching a point near the mesial aspect of the corresponding intestine the vasa pass directly cephalad until they reach a plane slightly (about 120μ) cephalad of the superior aspect of the superior testis, when each curves inward to unite with its fellow to form the vas deferens. In

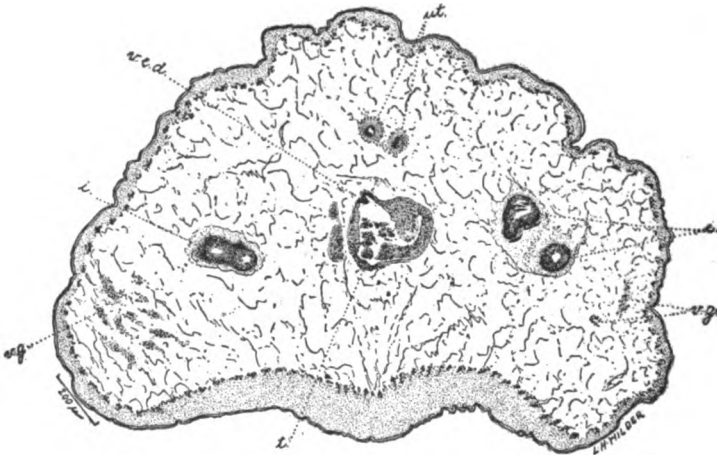


FIG. 171.

so doing the vasa efferentia form a transverse arch, beneath which the uterus passes as it ascends cephalo-ventrad. The vas deferens presents in the first part of its course a much coiled vesicula, which is succeeded in the second part by a coiled, well-developed musculosa. The latter gives place to a short prostatica. The terminal portion of the vas deferens is a short narrow duct, the ductus ejaculatorius, which unites at the base of the genital papilla with the terminal portion of the uterus to form the ductus hermaphroditicus (fig. 165, *d. h.*). The latter is a wide duct which pierces the genital papilla to open on the vertex of the latter at the porus hermaphroditicus.

Female organs.—The ovary lies posttesticular, a little to the left of the median sagittal plane, close to the acetabulum, and in or immediately caudad of the transverse plane of its superior margin. The oviduct springs from the dorsal aspect of the ovary and passes caudo-

dorsad, skirting the dorsal aspect of the shell gland and giving off Laurer's canal close to the dorso-caudal aspect of the latter. The main duct then penetrates this aspect of the shell gland. The shell gland, apparently somewhat larger than the ovary, lies immediately caudo-dorsad of the latter. It is, as just described, penetrated on its caudo-dorsal aspect by the oviduct; on its caudal aspect it is penetrated by a duct which is interpreted as the vitello-duct. The union between these ducts is not satisfactorily made out in our preparations, but no doubt it takes place to form a fairly distinct ootype, the continuation of which emerges from the ventro-cephalic aspect

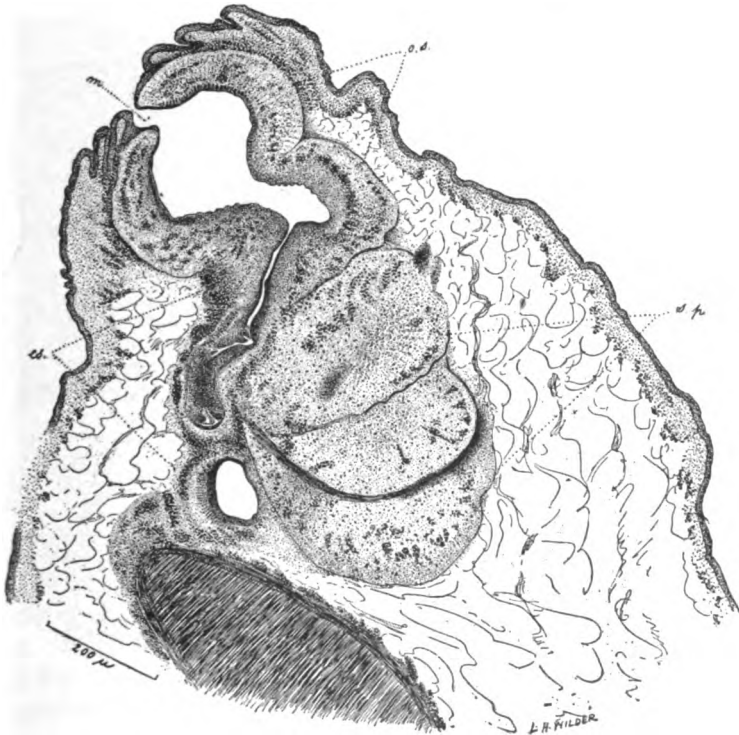


FIG. 172.

of the gland as the uterus (fig. 165). After emerging, the uterus turns to the right and dorsad, then dips caudad dorsally of the shell gland and in the axial region of the worm, forming some coils, then turns cephalad describing coils as it ascends between the dorsum and the testes. It passes ventro-cephalad over the superior testis and beneath the arch of union of the vasa efferentia to gain the ventral aspect of the coiled vas deferens. It retains this relation in the remainder of its course to the base of the genital papilla, where it

unites with the ductus ejaculatorius in the formation of the ductus hermaphroditicus.

Laurer's canal passes caudo-dorsad dorsally of the excretory vesicle to open in about the median line of the dorsum, cephalad of the excretory pore and slightly cephalad of the level of the caudal margin of the acetabulum.

The vitellogene glands, consisting of small insignificant follicles, are longitudinally disposed in the extracecal area, their caudal portions extending, however, into the cecal and to a slight extent into the intercecal area. Longitudinally they do not appear to extend

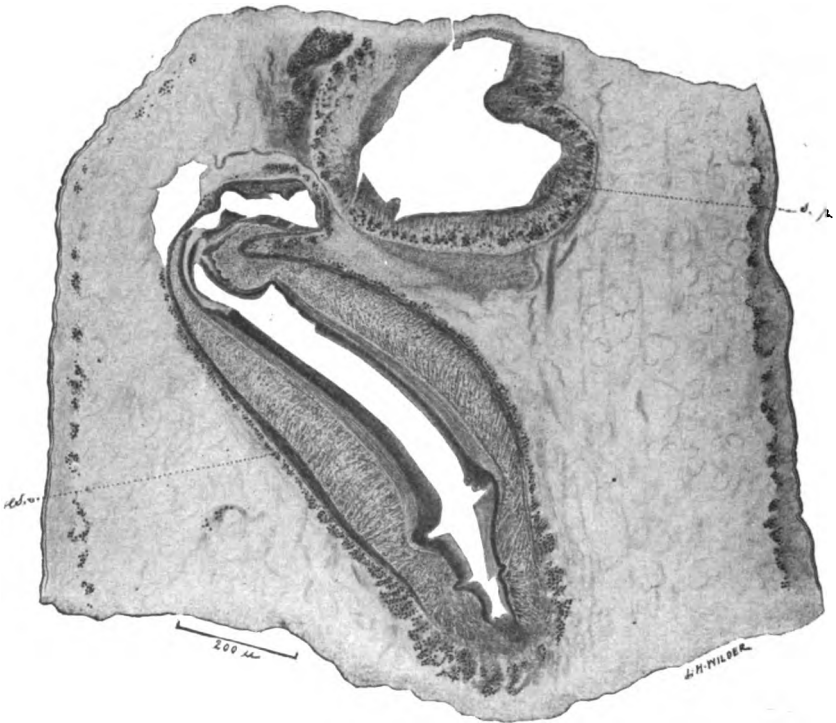


FIG. 173.

outside of the cecal zone, but this point can not be made out from our preparations as satisfactorily as is desirable.

EXCRETORY SYSTEM.—The excretory vesicle lies close to the dorsal aspect (the dome) of the acetabulum (fig. 165, *ex. v.*). It begins close to the ventro-caudal aspect of the shell gland and extends to slightly above the caudal margin of the acetabulum, beyond which point it is continued as a relatively thick duct to open in about the median line of the caudal extremity. This duct is inclosed in a well-marked layer of nuclei, probably of cells, the bodies of which, however, are not satisfactorily discernible. The excretory canals can not be satisfactorily followed in our preparations.

ILLUSTRATIONS.

FIG. 163.—Ventral aspect. Enlarged. Original.

FIG. 164.—Profile view of same. Enlarged. Original.

FIG. 165.—Diagrammatic sagittal section, showing oral sucker (*o. s.*), suctorial pouch (*s. p.*), esophagus (*es.*), testes (*t.*), vas deferens (*v. d.*), uterus (*ut.*), ovary (*ov.*), oviduct (*ov. d.*), shell gland (*s. g.*), Laurer's canal (*L. c.*), excretory vesicle (*ex. v.*), excretory pore (*ex. p.*), genital papilla (*g. pap.*), ductus hermaphroditicus (*d. h.*), and acetabulum (*ac.*). Enlarged. Original.

FIG. 166.—Transverse section (about through equator of oral portion of sucker, *o. s.*) to show its form and the perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 167.—Transverse section (at level of origin of esophagus) to show position and relations of suctorial pouches (*s. p.*) and beginning of esophagus (*es.*); also shows extension of perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 168.—Transverse section at beginning of bulbous portion of esophagus to show position and relation of fundi of suctorial pouches (*s. p.*) to this portion of the esophagus (*es.*). Shows also extension of perisuctorial space (*p. s. sp.*) and molding of venter over the esophagus. Enlarged. Original.

FIG. 169.—Transverse section at level of genital pore, showing subhemispherical genital bulging, genital pore (*g. p.*), pars musculosa (*p. m.*), ductus ejaculatorius (*d. e.*), and intestinal ceca (*i.*). Enlarged. Original.

FIG. 170.—Transverse section at level of origin of left vas efferens (*v. e. s.*) from superior testis (*t.*). Shows also position and relations of intestinal ceca (*i.*), uterus (*ut.*), right vas efferens (*v. e. d.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 171.—Transverse section at level of origin of right vas efferens (*v. e. d.*) from caudal testis (*t.*). Shows also position and relations of intestinal ceca (*i.*), uterus (*ut.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 172.—Sagittal section through oral extremity. Shows mouth (*m.*), oral sucker (*o. s.*), and first portion of esophagus (*es.*); also shows mesial wall of suctorial pouch (*s. p.*). Enlarged. Original.

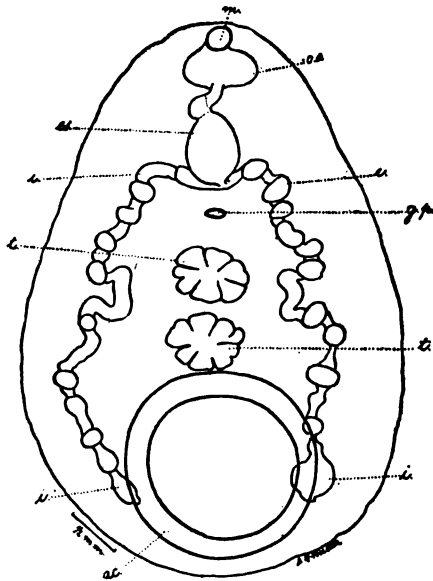


FIG. 174.

FIG. 173.—Sagittal section through second portion of esophagus (*es.*); shows also portion of suctorial pouch (*s. p.*). Enlarged. Original.

FIG. 174.—Diagram to show topography of digestive tract. *ac.*, acetabulum; *g. p.*, position of genital pore; *es.*, esophagus; *i.*, intestinal ceca (showing constrictions and dilatations); *m.*, mouth; *o. s.*, oral sucker (and pouches); *t.*, testes; Enlarged. Original.

WATSONIUS, new genus.

GENERIC DIAGNOSIS.—*Cladorchiinae* (p. 169): Body pyriform. Ventral pouch absent. Acetabulum ventral or ? ventro-subterminal; very large, margins projecting; aperture small. Genital pore prebifurcal, without sucker; ductus hermaphroditicus apparently absent. Excretory pore caudad of vesicle, in acetabular zone, caudad of pore of Laurer's canal. Oral sucker with a pair of latero-caudal irregularly globular suctorial pouches; esophagus with distal thickening of muscular layer (esophageal thickening); ceca long, not wavy, end postequatorial, posttesticular, in acetabular zone.

Male organs: Testes 2, lobulate, smaller than acetabulum, fields nearly or quite coincide, zones abut to slightly overlap, preovarial, not far removed from acetabulum, in equatorial and caudal thirds; muscloses not enormously developed; cirrus pouch absent.

Female organs: Ovary and shell gland immediately posttesticular; vitellaria extend about from bifurcal zone to slightly postcecal, into acetabular zone; uterus intercecal, in part posttesticular; Laurer's canal cephalad of excretory vesicle.

TYPE SPECIES.—*Watsonius watsoni* (Conyngham, 1904).

WATSONIUS WATSONI (Conyngham, 1904) Stiles & Goldberger, 1910.

[Figs. 175 to 189.]

1904: *Amphist. watsoni* Conyngham, 1904, Aug. 13, 464; Aug. 27, 355; 1905, Sept. 8; 1902, Sept. 17, 663, figs. 1-2 (in *Homo*, Africa); 1905, Sept. 29, 1480; 1905, Oct. 8, 710.—Shipley, 1905, 8 to *Cladorchis*.

1905: *Cladorchis watsoni* (Conyngham, 1904) Shipley, 1905, 129-135, pl. 4, figs. 1-10 (in *Homo*, Africa); 1905, 1-9, pl. 4, figs. 1-10; 1905, Apr., 205; 1905, Apr. 8, 950; 1905, Nov. 2, 1298; 1905, 9 pp., 10 figs.—Braun, 1908, 4 ed., 175-176, figs. 125-126.

SPECIFIC DIAGNOSIS.—*Watsonius* (p. 212): Body 8 to 10 mm. long, by 4 to 5 mm. in maximum breadth, by 4 mm. thick; fresh specimens reddish-yellow, translucent, gelatinous; preserved specimens dark slate to dirty brown in color; pyriform, greatest diameter about at border of equatorial and caudal thirds; tapers cephalad to about 2.5 mm.; tapers more rapidly caudad so that the caudal extremity is very bluntly rounded; lateral margins convex on ventral view; venter somewhat flattened and slightly indented posteriorly at margin of acetabulum; venter surrounded by an elevated ridge and bulges posteriorly [transverse sections are too irregularly contracted from preservation to permit of safe interpretation]. Surface with transverse ridges, coarser, and better defined ventrally. Genital pore ventro-median, "about 2 mm. from the oral sucker," or rather prominent, about one-fourth of body length from anterior end; about at equator of esophageal zone and in zone of suctorial pouches. Acetabulum ventro-subterminal (or ventral?), very large, over 1 mm. in diameter; its free margin projects considerably; aperture small. Mouth ventro-subterminal in a dorso-ventral groove (contraction?), with digitate papillae; oral sucker sunken in body, very large, about one-fifth as long as body, attains 1.2 mm. in transverse and 1.1 mm. in dorso-ventral diameter; with a pair of latero-caudal irregularly globular suctorial pouches, which extend about halfway to bifurcal zone; esophagus slightly longer than oral

sucker, distinctly bent, its convexity ventrad, its muscular wall thicker in its caudal half; ceca extend into fifth zone, ending in anterior half of acetabular zone, their lumina compressed laterally so that their dorso-ventral diameter is about 5 times as great as their transverse diameter. Excretory pore dorsal, apparently slightly sinistrad of median line, in zone of aperture of acetabulum; excretory duct thick-walled; excretory vesicle relatively small, dorsal of acetabulum, extends about from plane of transverse vitello-ducts to equator of acetabulum.

Male organs: Testes large, deeply notched (lobulated), each about one-seventh as long as body, one caudad of the other, in median line, fields coincide, zones overlap very slightly; each vas efferens springs from dorso-cephalic aspect [point of union not definitely traced]; vas deferens consists of vesicula seminalis intricately coiled and dilated, pars muscosa relatively short and not coiled, a dilated portion (corresponding to pars prostatica), in which no prostatic cells were found, a relatively long, narrow ductus ejaculatorius which opens on genital papilla, cephalad of metraterm, into papillated genital atrium; terminal portion is surrounded by a muscular mesh which forms a genital bulging; true cirrus pouch absent.

Female organs: Ovary slightly sinistrad (but apparently touches median line), dorso-caudad of posterior testis, dorso-cephalad of acetabulum; shell gland dorsad of ovary; vitellaria with moderate number of well-developed follicles, ventro-laterad of ceca, in extracecal and cecal area, extend from bifurcal zone into postcecal zone about to equator of acetabulum; uterus passes from shell gland ventro-dextrad into acetabular zone not quite to end of ceca, bends cephalad, runs in coils dorsally of testes, then in rather straight to sinuous course ventrally of vas deferens to its opening caudad of male opening; apparently no ductus hermaphroditicus present; Laurer's canal opens apparently in dorso-median line, very slightly caudad of cephalic limit of acetabular zone.

Eggs: Eggs oval, 122 to 130 μ long by 75 to 80 μ broad.

TYPE.—(?). Cotype U.S.P.H.&M.H.S. 10720.

HABITAT.—Jejunum and duodenum of man (*Homo*); German West Africa.

SOURCE OF MATERIAL.—We are indebted to the kind courtesy of Dr. A. E. Shipley, to whom we desire to express our sincerest thanks, for the loan of a series of transverse sections of this worm.

HISTORICAL REVIEW.—At a meeting of the Section of Tropical Diseases of the British Medical Association, on July 27, 1904, Dr. H. C. Conyngham, demonstrator at the London School of Tropical Medicine, presented a paper entitled "A new trematode of man (*Amphistoma watsoni*)."¹ This paper was abstracted in the *Lancet*, 1904, August 13, page 464, and *Journal of Tropical Medicine*, 1904, August 15, page 252. The full paper, which appeared in the *British Medical Journal*, September 17, page 663, reads as follows:

A NEW TREMATODE OF MAN (*Amphistoma watsoni*).

Last February Doctor Watson, of Northern Nigeria, sent six curious trematodes from the small intestine of a negro, who had died of starvation and diarrhoea, to the London School of Tropical Medicine. These proved to be a species of *amphistome*, totally unlike the *Gastrodiscus hominis* of Lewis—so far the only one of that genus found in man—and also unlike any hitherto described as occurring in animals. A specimen was sent to Professor Blanchard, of Paris, who very kindly examined it and reported that he considered it a new species. Doctor Watson sent some clinical notes of the case; they are as follows;

The patient—one of a gang of freed slaves, all of whom were in a pitiable condition due to starvation—was brought from Adamawa, German West Africa, to Zola, Northern

Nigeria. He was found to be suffering from diarrhea, and was admitted to hospital, where he died the same night. His stools were numerous, watery, and of a bilious color, but containing no blood or mucus. In the stools were found many reddish-yellow, translucent, gelatinous, oval bodies (the trematodes). Necropsy revealed the spleen small, hard, and black. In the stomach some undigested milk was found. The duodenum and upper part of the jejunum were found full of these oval bodies, some of which were alive and adherent. The mucus membrane showed no hemorrhages, but appeared to be slightly red. The other parts of the bowel, as also the other organs, were normal. A few of the bodies were seen lying in the large intestine. The patient was extremely fond of eating raw meat.

The animals are pear shaped, flattened ventrally and slightly indented posteriorly at the margin of the posterior sucker, but owing to the preservative used they have shrunk considerably and are now of a dark slate color. The anterior sucker in most of the specimens is retracted and lies at the bottom of a sulcus, which is terminal and ventral; the posterior sucker is very large, its cavity measuring over 1 mm. across; it is subterminal and ventral. The genital pore lies about a quarter of the length of the parasite from the anterior end and is rather prominent. The cuticle of the body is marked with transverse ridges, these being coarser and better defined on the ventral surface; the latter is flattened, surrounded by an elevated ridge and bulges posteriorly.

The worms measure 8 mm. long, 5 mm. at point of greatest breadth, this tapering gently anteriorly to 2.5 mm.; their greatest thickness is about 4 mm.

The genital pore lies 2 mm. from the anterior sucker. The ova as seen in the uterus are oval and measure 130μ by 75μ . It was found impossible to clear the specimens sufficiently to make out definitely their internal anatomy, but the general arrangement seems to be like that of the *Amphistoma conicum* (Zeder).

That these parasites may have been the cause of death is not at all unlikely, when it is considered that the larger part of the small intestine contained a great number of them and that at least one other species of the same genus causes serious sickness in the higher animals, namely, the amphistome of Collins in India, causing *masuri*, a condition of severe intestinal irritation in horses; and another, the *Gastrodiscus* of Sonsino, is supposed to cause death in horses and mules in Egypt, Senegal, and Guadeloupe. Another trematode of a different genus, the *Fasciolopsis buski*, inhabiting the small intestine of man, has been credited with causing intestinal irritation and typhoid-like symptoms, and this is occasionally followed by death.

These worms are, therefore, a new parasite of man, probably causing serious intestinal disturbance, diarrhea, marasmus, and death. Whether their distribution is limited, which is likely, remains to be seen; but by a careful examination of feces for ova, or adults in cases of diarrhea, it may be found again in at least that part of Africa in which the patient resided.

It is not at all probable that the eating of raw meat, which Doctor Watson notes, has anything to do with their introduction into the body, as parasites of that genus are, as a rule, ingested in the larval or cercarial form, encysted on some vegetable substance.

I would suggest that the name *Amphistoma watsoni* be given to the interesting parasite.

Shipley (1905, 3-9, pl. 4, figs. 1-10) gave the history of this trematode, as furnished by Doctor Watson, as follows:

The patient was a Pagan who had come from Adamawa, German West Africa—one of a gang of freed slaves brought to the resident of Zola, Northern Nigeria, nearly all of whom were in a terrible condition, due to starvation.

He made a certain amount of progress at first, but did not improve as the others, and had constant diarrhea. The stools were watery and of a bilious color, no blood or mucus in the same. He was taken into the hospital, but died the same night, and on

inspecting the stools passed during the night numerous reddish-yellow, translucent, gelatinous, oval bodies were found.

Post-mortem.—The lungs and heart were normal. Liver normal. The spleen small, hard, and black. The stomach contained some food, and on opening the small intestine the duodenum and upper part of the jejunum were found full of the oval bodies, none of them adherent, although they were alive. The mucous membrane was reddish, but no hemorrhages or petechiae were apparent. The rest of the bowel was normal, a few of the oval bodies found loose in the large intestine. The kidneys were normal. The oval bodies have shrunk considerably, and are only about a third of the normal size.

These Pagans appear to be extremely fond of raw meat, and eat fowls raw.

As Shipley made a careful anatomical study of this parasite, and as our results differ in some respects from his, Shipley's account is here reproduced for comparison:

II. ANATOMY.

Alimentary canal.—There is no true sucker at the anterior end. The mouth is a simple aperture leading into a pharynx, the walls of which form an almost spherical bulb. The lumen is lined with chitin, and the bulb is separated from the general parenchyma of the body by a basement membrane. Between the basement membrane and the chitinous lining lies a loose tissue crossed by numerous muscle fibers, which mostly run in a radial direction, but a few run circularly.

At first the lumen of the pharynx is compressed from side to side, but after about 30-35 sections from the anterior end the lumen has become depressed from above downward, and just here are found two short dorsal and ventral valves projecting like tongues into the lumen, only directed backward. They are attached anteriorly and free posteriorly. Behind these valves the lumen becomes diamond-shaped, the long axis being the transverse one, and here the bulb is at its largest and occupies a good deal of the area within the body wall. Its wall is also now divided into an outer and inner layer by a well-marked layer of circular muscles. The inner layer consists largely of radiating muscle fibers. The whole bulb lies somewhat freely in the very loosely vacuolated parenchyma, which seems to form a space around it, transversed only by a few sparse threads of protoplasm.

As we pass into the posterior half of the bulb the diamond-shaped lumen becomes a slightly oval slit whose angles shortly afterwards are turned down, thus forming a crescentic-like space in cross section. At the hinder end of the bulb these turned-down corners are cut off from the central lumen and form two lateral diverticula, the pharyngeal pouches. The diverticula, although they have their origin in the turned-down corners of the lumen, soon come to lie dorso-lateral of the central channel, and this alteration in relative position is caused by the central channel passing toward the ventral surface of the body. The pharyngeal pouches consist of the same kind of loose vacuolated tissue as the bulb; they are very thick walled and with small lumina.

Behind the bulb the lumen of what may now be called the esophagus deepens, and in the region of the anterior border of the genital pore the central portion of the alimentary canal is no longer surrounded by the characteristic tissue of the bulb, though the two dorso-lateral diverticula, which still persist, are. The lumina of these diverticula then become slightly coiled so as to appear twice in one section, and then each of them fades out and disappears altogether. At about the level where the anterior third of the body joins the posterior two-thirds, the esophagus divides into the two lateral diverticula, and around the λ -shaped lumen at this point is a thick bulb or sheath of muscle fibers mostly circular in their arrangement, though some are radial. Around them is a layer of longitudinal muscles. The lateral diverticula now pass outward and begin to include between them the reproductive organs. Each diverticu-

lum is flattened sideways and has a considerable dorso-ventral axis. They give off no secondary diverticula, though they are wavy or wrinkled, especially posteriorly, and here also they diminish in size, pass dorsally, and come to an end just about the level of the anterior lip of the great posterior sucker.

It does not seem possible to make out any cells lining any part of the gut. No epithelium is recognizable. The lumen is lined by a deeply-stained layer which looks like mucus, very thin in the pharynx, but quite thick in the intestinal diverticula. At the outer surface of this deeply-staining layer, darkly-stained structures, which may be nuclei, are here and there to be seen. The whole rests on a very definite basement membrane, and outside this in the region of the diverticula is a single layer of longitudinal muscles, the whole recalling in appearance the structureless lamella and the muscle tails of the ectoderm cells lying on it, in a hydra.

THE EXCRETORY SYSTEM.—The excretory pore lies in the middle line above the posterior sucker. It opens into a tube lined with cuticle directly continuous with that which clothes the body. This canal is pushed a little way out of the median line and lies, in the single specimen reduced to sections, a little to the left. Its walls soon thicken, and numerous darkly stained structures appear in its periphery; there may be nuclei or possibly sections through minute muscle fibers. Passing forward the canal enlarges and forms a spacious vesicle, which still lies over the sucker, spreading over its anterior end; from this vesicle, secondary canals pass up into the surrounding tissue. These, however, can not be traced farther in sections. The bladder or vesicle narrows again as we pass forward, and by the time the anterior edge of the sucker is reached it comes to lie between the hindermost ends of the diverticula of the alimentary canal. In front of this the main trunk seemed to divide into two, but beyond this they could not be traced.

THE PARENCHYMA.—This packing or ground tissue consists of large cells usually diamond-shaped in section. They are evidently very soft, and have been pulled out into strand-like structures where the cuticle has been elevated. The cells contain a granular-looking protoplasm. The cells underlying the cuticle are much smaller than those of the parenchyma within; the details could not be made out, but amongst and between them are some obvious muscle fibers. Similar muscle fibers lie outside the gut-diverticula, and many such fibers surround the outer parts of the reproductive ducts.

THE REPRODUCTIVE ORGANS.—There is a genital papilla situated in the middle ventral line about the level where the anterior quarter joins the posterior three-quarters. On this open close together the canal of the cirrus and the metratrema, the vas deferens opening slightly in front of the latter. The whole papilla is but slightly projecting; its tissue is closer and firmer than the usual body tissue. The distal end of the cirrus canal is muscular for a short space, and seems to have glands opening into it, but it soon gives a bend and opens into a thin-walled vesicle on the ventral surface, the vesicula seminalis, which in the specimen that was cut into sections contained a mass of spermatozoa. The genital papilla is on a level with the lateral diverticula of the esophagus, but the vesicula seminalis lies beneath the muscular pharynx, just where the alimentary canal is beginning to split into two diverticula. Ventral to it lies the small vagina with muscular walls which, just behind the level of the opening of the cirrus canal into the vesicula seminalis, expands into the thin-walled uterus.

The vesicula seminalis opens into the vas deferens dorsally, and begins to pass backward as a slightly coiled, thick-walled duct. This is still packed with spermatozoa. The thick-walled duct suddenly passes into a thin-walled duct, which is closely coiled and still packed with spermatozoa. The junction of the two is at the level where the uterus begins to pass dorsally; it continues, however, to lie ventral to the coiled thin-walled portion of the vas deferens. The testes are double, and

lie side by side, though one projects farther back than the other. They are ventral to the uterus, which for a short space lies between the glands and their ducts. The testes are closely adpressed to one another, and it is just possible that they unite at one point. They open straight into the thin-walled vas deferens. Each testis is deeply lobulated. The glands are packed with sperm morulas in various stages of development, their darkly stained nuclei giving the tissue a very characteristic appearance.

The metratrema or distal and modified end of the uterus opens close behind the vas deferens: it is a thick, muscular duct which passes backward for a short distance in a straight line. Just in front of the anterior border of the testes it enlarges into the uterus, and this begins to twist and loop, lying between the dorsally placed vas deferens and the ventrally placed testes. The uterus contains ova, but not in very great quantities; the eggs are incased in a shell and contain many deeply staining yolk granules, but little more can be made out. My measurements for an ovum, which looked unusually large, were 122μ by 80μ , but Conyngham gives 130μ by 75μ . Undoubtedly the eggs vary in size to a certain extent. The uterus coils a good deal over the testes, and at the posterior end of these glands its lumen enlarges, and it becomes filled with a glairy looking coagulum in which the ova lie embedded.

The ovary or germarium lies close behind the testes, and rather to the right of the body; it contains minute ova with large nuclei, closely packed together in some places and loosely in others. The whole, like the testes, is ensheathed in a connecting tissue casing. The oviduct leads from the anterior end and curves back above the ovary, it becomes almost immediately surrounded by the shell gland, and may here be called the ootype. Close behind the shell gland the ootype receives the opening of the vitelline duct and the inner end of Laurer's canal. The shell gland and the ovary come to an end at about the same level as the anterior edge of the posterior sucker. There is a well-marked canal of Laurer which passes almost directly dorsalward and opens in the dorsal middle line just in front of the posterior sucker.

The yolk glands are conspicuous, follicular structures, which take no stain, but remain a somewhat dirty-brown color, somewhat glistening. They extend forward as far as the reproductive pores, and they lie near the edge of the body, ventral to the right and left branches of the alimentary canal. The glands increase in number posteriorly, and in the region of the great sucker are very numerous. Their minute ductules fuse together and gradually unite into right and left ducts that open into the ootype, which is surrounded by the shell gland, and in which the egg is made up. Into the same space opens the duct of the yolk reservoir, which is a coiled receptacle, full of yolk, lying to the left and opposite the ovary.

III. SYSTEMATIC POSITION.

The trematode we have to do with has been described by Mr. H. F. Conyngham as a species of the genus *Amphistoma*, which he calls *Amphistoma watsoni*. Dr. F. Fischöder has recently pointed out that the name *Amphistoma* is in reality a synonym of the genus *Strigea*, but the original *Strigea* has since been described as *Holostomum macrocephalum*, and if *Strigea* is to be revived it must be for that form. Hence, Doctor Fischöder proposes to us the name *Paramphistomum* for what we have used to term *Amphistomum*, and the name *Paramphistomidae* for the family to which they belong. Whether we follow the classification of Bronn's Thierreich or, as I propose to do, the later classification of Fischöder, it is impossible to class the new human parasite described above as an *Amphistomum*, because that species is characterized, amongst other things, by the absence of the lateral diverticula of the pharynx, which form so characteristic a feature of our species. This fact, however, could only be determined by cutting the animal into sections, and therefore escaped the notice of Mr. Conyngham.

Fischœder divides the *Paramphistomidae* of the Mammalia into two subfamilies: (i) the *Paramphistominae* with the genera *Paramphistomum*, *Stephanopharynx*, and *Gastrothylax*, all these being devoid of pharyngeal side pouches, and (ii) the *Cladorchinae* with the genera *Cladorchis*, *Chiorchis*, *Gastrodiscus*, *Homalogaster*, and *Balanorchis*. Of these genera *Cladorchis* is characterized by having the body not divided into anterior and posterior portions, by having the lateral edges rounded, by having the ventral surface slightly hollowed, and in all these respects our genus agrees with *Cladorchis*, and differs from the other members of the subfamily. I therefore place it in this genus.

CLADORCHIS WATSONI (Conyngham).

SYNONYM.—*Amphistomum watsoni* (Conyngham).

Length, 8–10 mm.; greatest breadth, 4–5 mm., tapering toward the anterior end to about 2.5 mm.; and depth about 4 mm.; color, when fresh, reddish-yellow, when preserved, a dirty brown; when fresh, translucent and gelatinous; the ventral surface transversely wrinkled, the aperture to the posterior sucker small, but the sucker itself big; no distinct sucker anteriorly but a well-marked pharyngeal bulb; the two pharyngeal pouches project beyond the outer limit of the bulb; circular sphincter round the esophagus just where it forks; distinct genital papilla, testis lobed, divided into two, side by side, anterior to ovary; Laurer's canal straight, opening anteriorly to excretory vesicle in middle line above the posterior sucker; the latter is very large and vaulted; the ova measure from 122–130 μ by 75–80 μ .

HABITAT.—*Homo sapiens*, a West African negro, jejunum and duodenum, very few in the large intestines.

So far as we are aware, all other reference to this species are based upon the foregoing papers.

EXTERNAL CHARACTERS.

SIZE.—Conyngham (1904) states that the worms measure 8 mm. in length and 5 mm. in greatest breadth, tapering gently cephalad to 2.5 mm. in breadth, and 4 mm. in greatest thickness.

Shipley (1905) gives the length as from 8 to 10 mm., greatest breadth 4 to 5 mm., tapering toward the oral extremity to about 2.5 mm., and 4 mm. in dorso-ventral diameter.

COLOR.—In Watson's clinical notes quoted by Conyngham (1904) the fresh specimens are described as reddish-yellow, translucent, gelatinous bodies. Conyngham states that after fixing and in the preserved state they become a dark slate color. Shipley (1905) gives the color as reddish-yellow, translucent, and gelatinous in the fresh state and a dirty brown when preserved.

FORM.—Conyngham describes them as pear shaped (figs. 175, 176), flattened ventrally and slightly posteriorly at the margin of the posterior sucker, but very much shrunken from the action of the preservative.

SURFACE.—Conyngham states that the cuticle is marked by transverse ridges which are more coarse and better defined on the ventral surface. The anterior sucker is described as being retracted in most of the specimens and as lying at the bottom of a ventro-

terminal sulcus. The venter is described as flattened, surrounded by an elevated ridge and as bulging posteriorly.

Genital pore.—The genital pore is given as being 2 mm. from the anterior sucker, presumably in the ventro-median line, or about one-fourth of the length of the parasite from the anterior end and is stated to be rather prominent. Shipley (1905) states that there is no true oral sucker, and that the venter is transversely wrinkled. Shipley mentions a genital papilla as situated in the midventral line about the level where the anterior fourth joins the posterior three-fourths.

Acetabulum.—Conyngham states that the “posterior sucker is very large, its cavity measuring over 1 mm. across; it is subterminal and ventral.” Shipley describes the posterior sucker as big, but with a small aperture.

We find that the rim of the acetabulum projects considerably beyond the embrace of the body parenchyma in a manner very similar to that which obtains in *Ps. stanleyi* and, as in the latter, it forms a ring around the aperture, being encircled by a deep, narrow groove (figs. 175, 189), which marks it from the general surface.

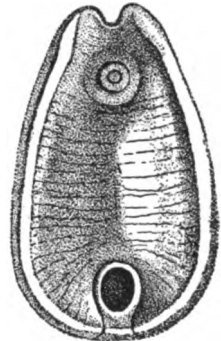


FIG. 175.

INTERNAL ANATOMY.

DIGESTIVE TRACT.—The oral extremity of the worm is marked by a dorso-ventrally directed groove-like depression which encroaches slightly on the ventral surface. By Conyngham this is described as a ventro-terminal sulcus and this is pictured, though not mentioned, by Shipley (fig. 175). The surface of this depression is beset by digitate papillæ. It leads by an irregularly circular aperture about 165μ in diameter directly into the oral sucker. The latter (figs. 178, 179) is a large organ; in length it equals about one-fifth of the total body length. Its maximum transverse and dorso-ventral diameters are at about its equator, and measured from sections are 1.2 mm. and 1.1 mm., respectively. These diameters decrease in the direction of both poles, but more particularly toward the oral pole, which is bluntly pointed.

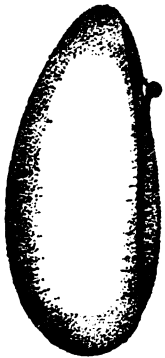


FIG. 176.

The decrease in these diameters, in the direction of the caudal pole or base, is progressive though slight. A little above the level of the base the decrease in the transverse diameter ceases; soon this diameter begins to expand, this expansion being due to

the extension at first laterad and then dorso-laterad in the form of pouches of the sucker from the region of its caudo-lateral aspect. The ventro-dorsal diameter, however, continues progressively to decrease, the base of the sucker viewed in sagittal plane being rounded, tilted somewhat ventrad and giving origin to the esophagus.

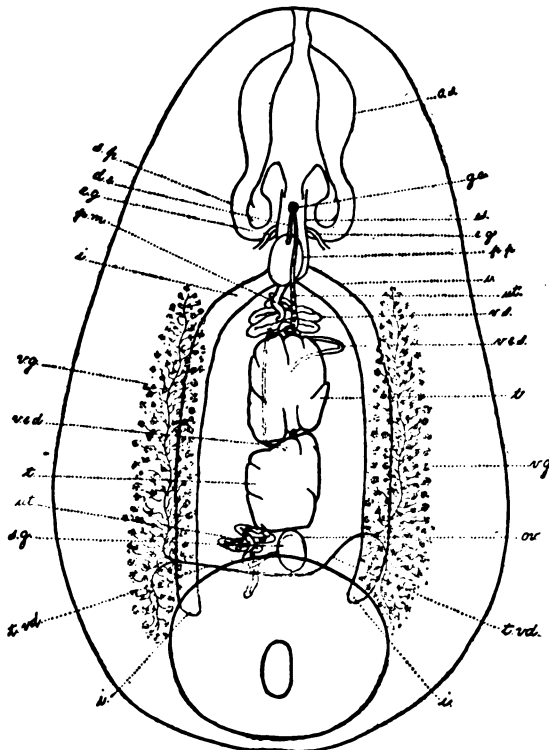


FIG. 177.

The pouches are irregularly globular in form and as they extend latero-caudad come to lie close to the dorso-lateral aspects of the first portion of the esophagus. The caudal third of the sucker and its pouch-like prolongations are in a well-marked perisuctorial space (fig. 181), in which they are retained in position by mesenterium-like strands extending from the parenchyma particularly to the dorsal and ventral as-

pects of the sucker. The structure of the suctorial wall differs somewhat at different levels. At the oral pole the suctorial wall consists of parenchyma-like cells with some radial, circular, and longitudinal muscular fibers arranged beneath the cuticular lining of the lumen. Farther caudad, however, these muscular fibers increase in number and except for the radial bundles are massed into a well-defined inner zone as contrasted to an outer zone of the parenchyma-like cell structure. Just above the level of origin of the pouches the inner muscular zone forms the greater portion of the thickness of the wall, the cell structure of the outer zone at the same time becoming greatly condensed. The structure of the pouch walls shows a similar relatively narrow muscular zone in which the circular is most prominent, and an outer parenchyma-like zone.

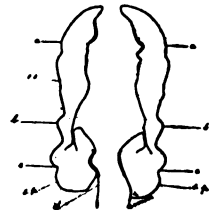


FIG. 178.

The lumen of the sucker, in a general way, is a dorso-ventrally narrow, but transversely a relatively broad space. Caudo-laterally it extends into the caudo-lateral prolongations or suctorial pouches of the sucker. Besides variations in the dorso-ventral diameter of the lumen at different levels, naturally to be expected from irregularities in the degree of contraction at the time of fixing, there are differences due to peculiarities in form of the suctorial wall itself. Beginning at the oral aperture of the sucker the lumen for some distance caudad maintains a fairly uniform dorso-ventral diameter, then rather abruptly this becomes decidedly increased. This increase is due to a retraction in the dorsal and in the ventral suctorial wall so as to form what Shipley describes as "dorsal and ventral valves projecting like tongues into the lumen, only directed backward" (fig. 179). These transverse projecting tongues or ridges are not continuous laterally; the interval thus left increases to a corresponding degree the dorso-ventral diameter of the lumen at its lateral angles; the form in transverse section of the lumen at the level where these ridges are formed suggests to a slight extent the letter H (fig. 180).

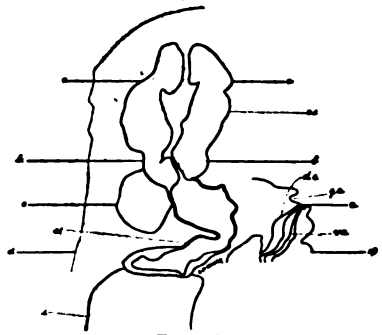


FIG. 179.

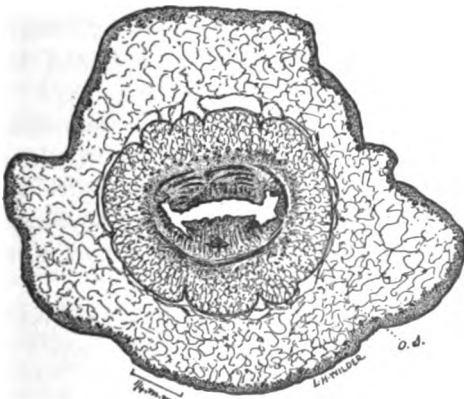


FIG. 180.

Almost at once, however, the dorso-ventrally expanded lumen resulting from the retraction of the dorsal and the ventral suctorial walls, above described, begins to contract and continues progressively to decrease to the level of origin of the pouches. In this region the lumen becomes very abruptly greatly narrowed dorso-ventrally by the projection upward into the lumen from its dorsal wall of

a transverse tongue-like ridge recalling a similar structure in *Ps. stanleyi* (fig. 179). In transverse sections the first portion of the suctorial lumen is a transverse slit, the second portion is at first fusiform or diamond-shaped in outline, eventually becoming crescentic with the concavity of the crescent ventrad (fig. 181). By the projection

upward of the tongue-like transverse ridge the horns of the crescentic lumen become partly separated from the body, so that at this level the lumen, as in *Ps. stanleyi*, somewhat suggests the letter H. The terminal portion of the suctorial lumen also appears as a transverse slit in section.

The lumen of the sucker and that of its pouches is lined with a cuticle-like layer; in the first portion of the sucker the cuticle is beset with conical papillæ of moderate size.

From its point of origin the esophagus passes at first ventro-caudad, then at about its equator it bends abruptly and sharply dorsad with a tilt caudad. Viewed ventrally the esophagus is apparently much shorter than the sucker, but in sagittal plane it is at once seen that it slightly exceeds the length of the latter. The esophageal wall is muscular throughout, but in the caudal half the muscular layer is particularly well developed, attaining a maximum thickness of about 67μ . Because of the obliquity of this portion of the esophagus certain of the transverse sections cut its wall almost tangentially, and consequently the observer is readily misled into interpreting such a section as indicating an enormously thick muscular wall (fig.

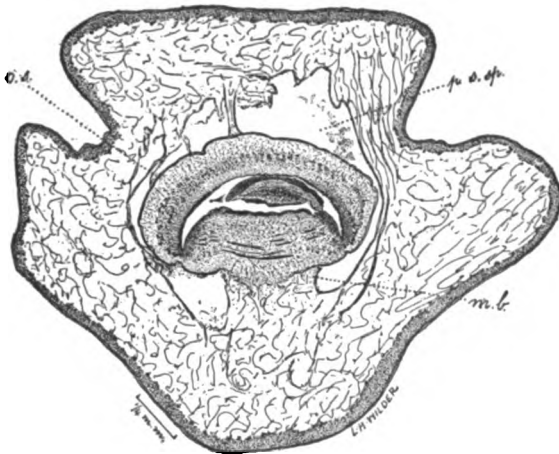


FIG. 181.

183). Viewed ventrally, therefore, this portion of the esophagus would have somewhat the appearance of a muscular bulb, such as Shipley describes and pictures.

The first half of the esophagus is dilated in the dorso-ventral diameter, but compressed from side to side. The esophageal lumen is lined throughout with a rather thick cuticular layer.

The intestines spring from the lateral aspects of the caudal portion of the esophagus. At first they arch caudo-laterad, they then pass directly caudad in relation to, though at some distance from, the dorso-lateral aspect of the body. They terminate by cecal extremities slightly caudad of the junction of the fourth with the caudal fifth of the body length, or slightly caudad of the plane of the cephalic margin of the acetabulum, the right tube extending slightly farther caudad than the left. In transverse section the ceca appear compressed from side to side with proportionately a greatly elongated

dorso-ventral diameter, the former bearing a relation of 1 to about 5 of the latter.

GENITAL SYSTEM.—With the exception of the vitellaria and the copulatory apparatus the genital organs are situated in the inter-cecal area.

Male organs.—The testes are in the axial region of the body, though somewhat nearer the venter than the dorsum; the superior testis is in the equatorial zone of the worm, occupying in this region about one-seventh of the body length; the inferior or caudal testis also occupies about one-seventh of the body length in a zone contiguous to and immediately caudad of that of the superior testis. Both testes are deeply indented by fissures and sulci in such a manner as readily to lead to the erroneous interpretation that the testes are side by side in close apposition, particularly as the caudal aspect of the superior and the cephalic aspect of the inferior testis are in close apposition and their contiguous lobes marked off by their fissures and sulci overlap slightly, and consequently portions of both testes appear in certain of the transverse sections (fig. 185).

A vas efferens springs from the dorso-cephalic aspect of each testis (fig. 184); then it passes cephalo-dorsad, that from the superior testis tending to the left and that from the inferior to the right of the median sagittal plane. At about the level of the cephalic aspect of the superior testis the left

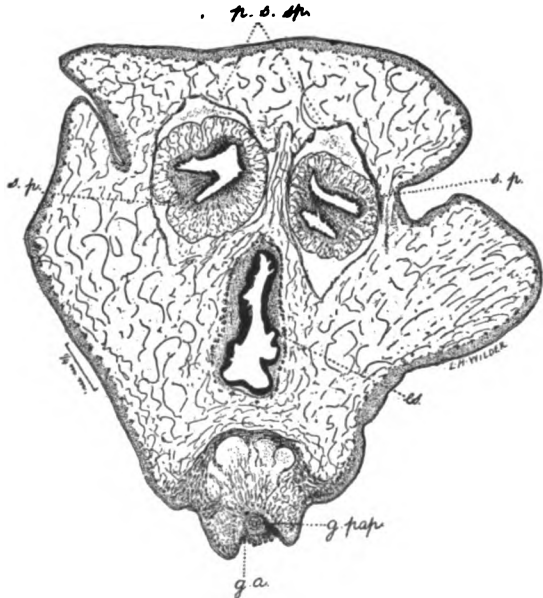


FIG. 182.

vas efferens approaches close to the mesial aspect of the left intestine; it then curves inward as it courses cephalo-dorsad and very soon enters the complex of the coils formed by the vas deferens amongst which it can not be followed. The right vas, as already stated, passes cephalo-dorsad and to the right immediately after its origin from the caudal testis. It skirts the caudal aspect of the superior testis, then after reaching the right caudo-dorsal aspect of this testis it bends and proceeds almost directly cephalad in close relation to the right dorso-lateral aspect of the superior testis

until it reaches a level a little short of that at which the left vas efferens originates, when it begins to tilt dorsad, at the same time becoming considerably distended with spermatozoa (fig. 184). Shortly beyond this point it begins to wind and enters the coil-complex of the vas deferens, beyond which point it is impossible to trace it satisfactorily. The two vasa efferentia presumably enter into the formation of the vas deferens and it would appear, though this can not be made out satisfactorily in this series of sections, as if each, before their union, became considerably distended and coiled, their coils being indistinguishable from those of the first portion of the vas deferens.

The vas deferens presents at first a thin-walled intricately coiled

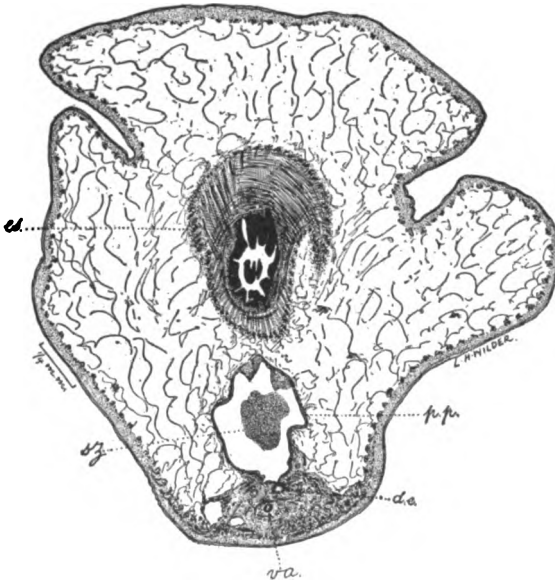


FIG. 183.

dilated portion or vesicula seminalis. These coils are in the intercecal space, elongated from venter to dorsum and dorsum to venter and winding cephalad; they are succeeded by a muscular-walled segment or pars musculosa, the wall of which, measured at a favorable point, was about 60μ thick. This portion is relatively short, uncoiled, though making about one spiral turn in its somewhat

sinuous course ventro-cephalad. In its turn, at about the level of the esophageal fork, this is abruptly succeeded by a short greatly dilated portion with muscular walls intermediate in thickness between those of the vesicula and pars musculosa. This portion, which Shipley interpreted as the vesicula seminalis and which corresponds to the vesicula seminalis interna of the forms with a cirrus pouch, appears homologous with the type of pars prostatica of *Homalogaster philippinensis* and that of *Ps. stanleyi*, more particularly the latter, in which the prostatic cells are few, while in this (*Watsonius watsoni*) species no prostatic cells at all can be distinguished. It is abruptly succeeded by a thin walled duct of a much smaller caliber which with the terminal portion of the uterus close to its ventral aspect at

once plunges into a sharply delimited muscular mesh as it proceeds cephalo-ventrad. This is relatively long and eventually opens at the vertex of a genital papilla by a small pore separate from and immediately cephalad of the opening of the metraterm. This terminal portion of the vas deferens is homologous with the ductus ejaculatorius. It may be well to describe at this point what may be designated as the copulatory apparatus.

In the median line of the ventral surface at a point about one-fourth the length of the worm from its oral margin is a well-marked ring-like elevation or bulging which encircles a second more sharply

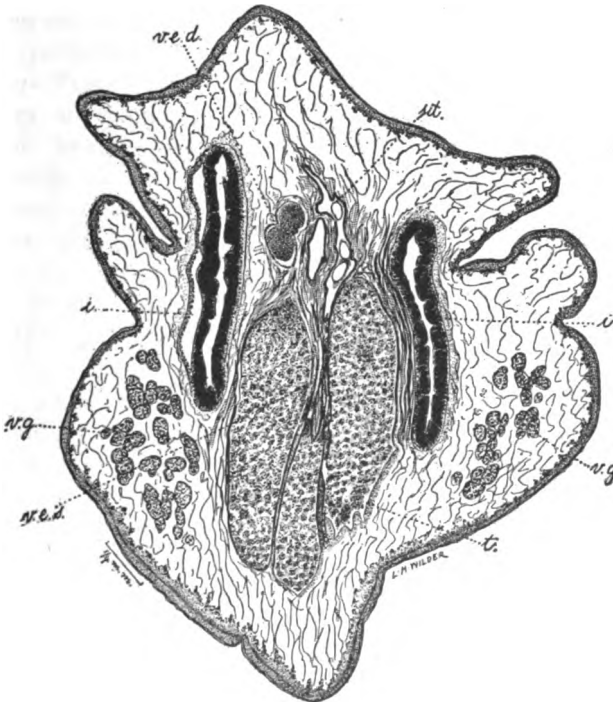


FIG. 184

defined truncated cone-like bulging measuring about $225\ \mu$ from base to vertex, about $600\ \mu$ in transverse diameter at the base, and about $375\ \mu$ at the vertex. The vertex of this second cone-like projection is depressed or crateriform and may perhaps be regarded as the genital atrium, from the dorsal wall of which the genital papilla projects. These structures are well shown in surface view in figure 175 and in transverse section in figure 182. The crateriform depression into which the genital papilla projects is beset by numerous quite small papillæ. The form of the genital papilla can not be made out satisfactorily;

one gains the impression that it is a low, broad, rounded elevation. In sections it may be seen that the internal structure of the genital bulging is made up of a muscular mesh which is sharply delimited from the body parenchyma by a well-defined curved (with convexity dorsad) muscular layer of transverse, radiating, and vertical bundles. It is this curved limiting layer (somewhat suggestive of a cirrus pouch) that, as already mentioned, is pierced by the ductus ejaculatorius and the terminal portion of the uterus or metraterm. The structure of this copulatory apparatus suggests the probability that it may be collapsible or retractile. The genital papilla is just caudad of the

level of the base of the sucker (or origin of the esophagus).

Female organs.—The ovary is in the axial region of the body in the intercecal area a little nearer the left than the right intestine, caudo-dorsad of the caudal testis and dorso-cephalad of the acetabulum and in a zone directly caudad of and slightly overlapping the zone of the caudal testis (fig. 186) superiorly and to a slight degree overlapping the acetabular zone inferiorly (caudally). The ovary is dorso-ventrally elongate, measuring about 0.66 mm. in this and

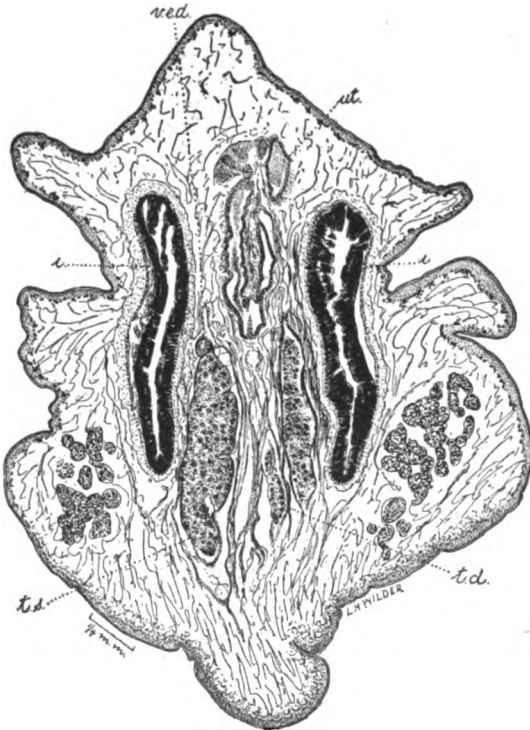


FIG. 185.

about 0.25 mm. in the transverse diameter. From its dorsal-cephalic aspect (fig. 186) the oviduct takes origin. This passes directly dorsad for about 150μ of its length and then bends caudad, almost immediately penetrating the cephalic aspect of the shell gland, at the same time giving off Laurer's canal. The latter proceeds dorsad (fig. 187) with but a slight inclination caudad and reaches the dorsum in about the median line or only slightly if at all to the right of it, and at a point in a plane marking the caudal limit of the ovarian zone and therefore only slightly caudad of that of the superior limit of the acetabular zone (or superior margin of the acetabulum) (fig. 188).

The shell gland is placed directly dorsad of the ovary; the caudal limit of its zone is the same as that of the ovarium, though because the vertical diameter of the shell gland is slightly less than that of the latter the zones of the two glands are not quite coextensive, the upper (cephalic) limit of the shell gland being slightly below (caudad) of that of the ovary. As already mentioned the oviduct penetrates the cephalic aspect of the shell gland, in the substance of which it unites with the common vitello-duct. The duct resulting from this union at once

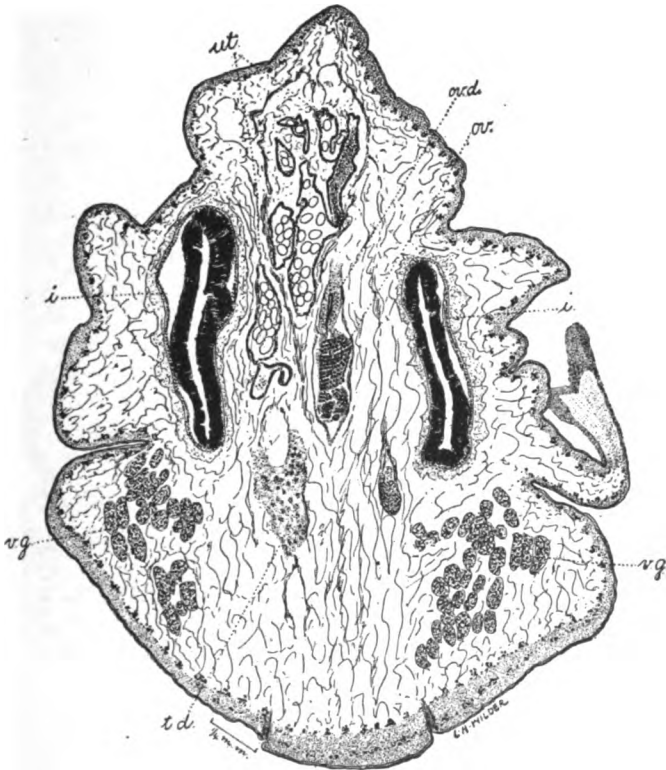


FIG. 186.

forms a fusiform dilatation, the ootype, which passes ventrad with a slight obliquity to the right and caudad in the major axis of the shell gland. The continuation of the ootype becomes the uterus which emerges from the ventral pole of the gland (fig. 187). After emerging, the uterus passes ventro-dextrad into the field between the ovary and the right intestine, but doubles back before it has quite reached the frontal plane of the ventral margin of this intestine, and thus completes a loop directed ventrad. On reaching a point to the right of the dorsal pole of the shell gland it dips caudad, the loop thus formed

coming into close relation to the right aspect of the dome of the excretory vesicle. After forming this loop the uterus continues dorsad until it reaches the field to the right of the line of Laurer's canal and dorso-mediad of the right intestinal cecum, where it forms some coils and begins its ascent cephalad, forming dorso-ventral loops, at first in the field between the right intestine on the one side and the ovary and shell gland on the other; later these loops are in the median line in the intercecal area between the testes and the dorsum. The uterus winds its way cephalad in this field, dorsad of the testes, until it

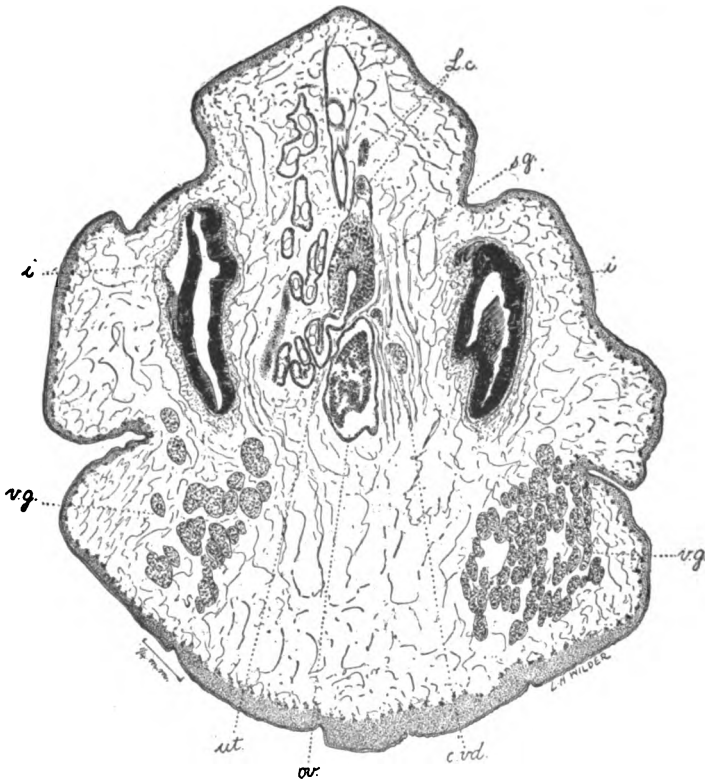


FIG. 187.

reaches the level of the caudal aspect of the vas deferens. Here it tends ventrad to gain the ventral aspect of the vas deferens, arching across the cephalic aspect of the superior testis. At the same time it ceases to form coils, proceeding in a sinuous but direct course cephalo-ventrad. From the level of the esophageal fork it is continued as the metraterm, and, as already mentioned, this pierces the muscular mesh of the copulatory apparatus to open immediately caudad of the ductus ejaculatorius at the vertex of the genital papilla.

The first loop formed by the uterus after its emergence contains a considerable number of vitelline cells, suggesting the idea of a yolk

reservoir. It is probably on this account that Shipley was led into interpreting this as a separate structure, to which he applied the name "yolk reservoir." In the remaining loops a considerable number of eggs were noted. Here and there in the coils dorsad of the testes there are masses of spermatozoa in which some of the eggs are embedded.

The vitellogene glands, consisting of a moderate number of loosely aggregated, well-developed follicles, are situated in the fields between the ceca and the ventro-lateral aspect of the body; that is, ventrad

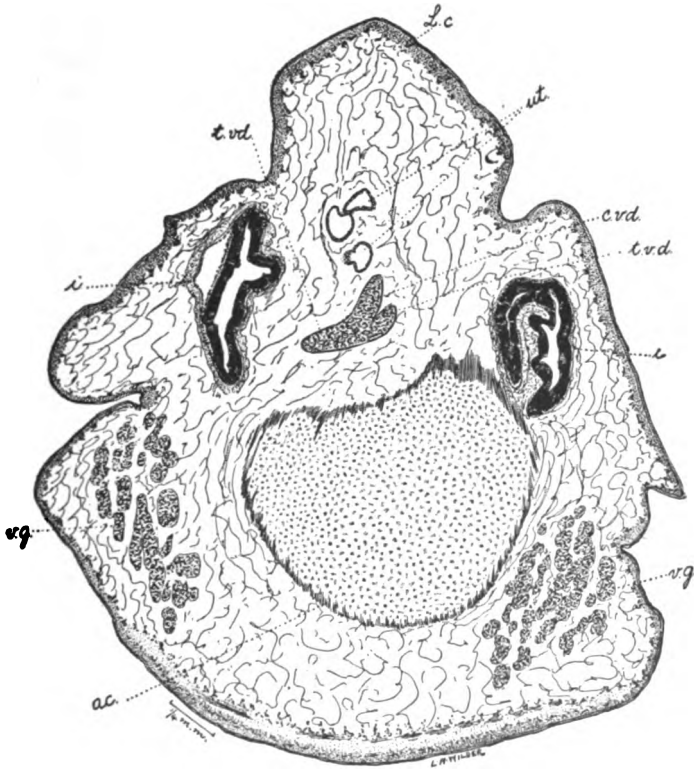


FIG. 188.

and ventro-laterad of the ceca and ventro-laterad of the upper (cephalic) portion of the acetabulum. Longitudinally they extend from about the level of the esophageal fork to or slightly caudad of the level of the upper margin of the acetabular aperture. The gland of the left side is a little shorter than that of the right. A duct of considerable caliber, distended with yolk cells, leaves the gland of each side—that of the left at a point slightly cephalad of the superior margin of the ovary; that of the right at about the level of the ootype. These ducts, the transverse vitello-ducts, pass dorso-mediad and more or less caudad ventrally of the intestinal ceca to unite close to the

caudal aspect of the shell gland. From their point of union, which is not dilated into a reservoir, a common vitello-duct arises and passes very obliquely dorso-cephalad and almost at once penetrates the shell gland. The common, like the transverse ducts, is distended with yolk cells and at first is of about the same caliber as the latter, but as it enters the substance of the shell gland its caliber becomes rapidly reduced in diameter. As has already been stated, it joins with the oviduct to form the ootype.

EXCRETORY SYSTEM.—The excretory vesicle is in the caudal portion of the body, dorso-cephalad of the acetabulum. It is relatively small; its dome extends a short distance cephalad into the caudal

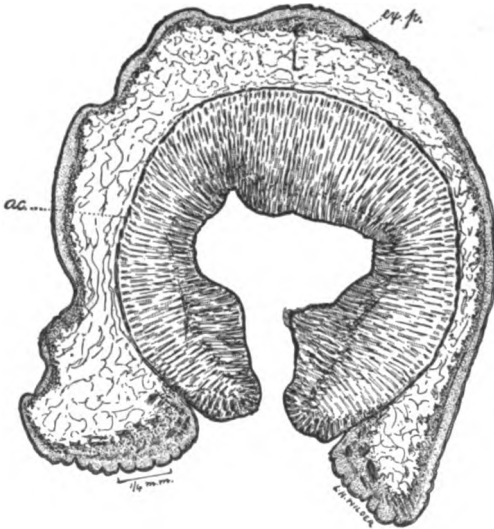


FIG. 189.

portion of the intercecal space, attaining the level at which the vitello-ducts unite; caudad it extends to about the level of the upper margin of the acetabular aperture. Here it gives off a thick-walled duct which passes dorso-caudad to open on the dorsum, apparently slightly to the left of the median line, at a point in a plane slightly cephalad of that of the lower margin of the acetabular aperture, and therefore at some considerable distance caudad of the pore of Laurer's

canal. The excretory duct is lined with a cuticular layer. Excretory canals are seen to enter the excretory vesicle, but they can not be satisfactorily traced.

ILLUSTRATIONS.

FIG. 175.—Ventral view, \times about 4. (After Shipley, 1905, fig. 1.)

FIG. 176.—Profile view, \times about 4. (After Shipley, 1905, fig. 4.)

FIG. 177.—Ventral projection (diagrammatic) to show internal anatomy: *d. e.*, ductus ejaculatorius; *es.*, esophagus; *e. g.*, esophageal ganglion; *g. a.*, genital atrium, with openings of ductus ejaculatorius (upper pore) and metraterm (lower pore); *i.*, intestinal ceca; *o. s.*, oral sucker; *ov.*, ovary; *p. m.*, pars muscosa; *p. p.*, (?) pars prostatica; *s. g.*, shell gland (dorsally of ovary); *s. p.*, suctorial pouch; *t.*, testes; *t. vd.*, transverse vitello-ducts; *ut.*, uterus; *v. e. d.*, right vas efferens; *v. e. s.*, left vas efferens; *v. g.*, vitellaria; *v. s.*, vesicula seminalis. Enlarged. Original.

FIG. 178.—Ventral projection of oral sucker (*o. s.*), suctorial pouches (*s. p.*), and portion of esophagus (*es.*). *a-a*, *b-b*, *c-c*, planes of section. Enlarged. Slightly diagrammatic. Original.

FIG. 179.—Profile projection of oral sucker (*o. s.*), suctorial pouch of left side (*s. p.*), and esophagus (*es.*). Shows also the position of the genital atrium (*g. a.*). *a-a*, *b-b*, *c-c*, *d-d*, planes of section. Slightly diagrammatic. Enlarged. Original.

FIG. 180.—Transverse section through plane *a-a* figs. 178 and 179. Shows oral sucker (*o. s.*); H-formed lumen of oral sucker (with papillæ) at this level. Enlarged. Original.

FIG. 181.—Transverse section through plane *b-b* figs. 178 and 179. Shows crescentic lumen of oral sucker (*o. s.*), with transverse tongue-like ridge projecting upward into it. Shows also perisuctorial space (*p. s. sp.*) with ventral mesenterial band (*m. b.*). Enlarged. Original.

FIG. 182.—Transverse section through plane *c-c* figs. 178 and 179. Shows genital bulging with genital atrium (*g. a.*) beset with papillæ; the genital papilla (*g. pap.*) with opening of the ductus ejaculatorius; the limiting muscular layer of the copulatory apparatus; the esophagus (*es.*), suctorial pouches (*s. p.*), and extensions of the perisuctorial space (*p. s. sp.*) inclosing the pouches. Enlarged. Original.

FIG. 183.—Transverse section through plane *d-d* fig. 179. Shows metraterm (*va.*), ductus ejaculatorius (*d. e.*) just after its departure from the (?) pars prostatica (*p. p.*), which contains a mass of spermatozoa (*sz.*), and the esophagus (*es.*) with its dorsal wall cut tangentially, giving the impression of great thickness. Enlarged. Original.

FIG. 184.—Transverse section at level of origin of left vas efferens (*v. e. s.*). Shows terminal portion of right vas efferens (*v. e. d.*) distended with spermatozoa, the superior testis (*t.*), uterus (*ut.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 185.—Transverse section through overlapping portions of the superior testis (*t. s.*) and inferior testis (*t. d.*). Also shows uterus (*ut.*), intestine (*i.*), vitellaria (*v. g.*), and right vas efferens (*v. e. d.*). Enlarged. Original.

FIG. 186.—Transverse section through caudal extremity of inferior testis (*t. d.*). Shows ovary (*ov.*) with oviduct (*ov. d.*), uterus (*ut.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 187.—Transverse section immediately above level of superior margin of acetabulum. Shows ovary (*ov.*), shell gland (*s. g.*) with ootype and emerging uterus (*ut.*), Laurer's canal (*L. c.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 188.—Transverse section at level of the pore of Laurer's canal (*L. c.*). Shows acetabulum (*ac.*), formation of common vitello-duct (*c. vd.*) by the union of the transverse vitello-ducts (*t. vd.*), loop of uterus (*ut.*), intestines (*i.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 189.—Transverse section at level of excretory pore (*ex. p.*). Shows acetabulum (*ac.*) with projecting rim of aperture. Enlarged. Original.

PSEUDOCLODORCHIS Daday, 1907.

GENERIC DIAGNOSIS.^a—*Cladorchiinæ* (p. 169): Body rather cylindrical, venter rather convex, dorsum convex, cephalic end rather attenuate, caudal end rounded, sides rounded. Ventral pouch absent. Acetabulum ventro-subterminal, large; aperture circular, medium, directed slightly ventrad. Genital pore without sucker. Excretory pore postvesicular, in equatorial zone, caudad of pore of Laurer's canal. Oral sucker with 2 sphincters, one anterior, the other esophageal, and with paired not very well-developed evaginations; esophagus springs from caudal end of sucker and is without muscular thickening; ceca straight or slightly wavy, rather long, end post-equatorial, preacetabular.

Male organs: Testes 2, much smaller than acetabulum, elongate, lobate, fields separate or abut, zones overlap or nearly coincide, preovarial, quite removed from acetabulum, never in caudal third; cirrus pouch present.

Female organs: Ovary and shell gland posttesticular; vitellaria never pretesticular, are close to ceca in cecal to postcecal zones, chiefly posttesticular, "branched, tree like;" uterus chiefly in intercecal field, with tendency to transverse slings, ventral of cecal plane; Laurer's canal chiefly prevesicular, does not cross excretory canal or vesicle.

TYPE SPECIES.—*P. cylindricus* (Dies., 1836).

PFENDERIUS,^b new genus.

GENERIC DIAGNOSIS.—*Cladorchiinæ* (p. 169): Body rather conical, dorsum convex, venter slightly convex, cephalic end attenuates gradually but considerably, caudal end slightly, sides rounded. Ventral pouch absent. Acetabulum terminal, with projecting margins, relatively large, its shallow cavity provided with prominent papillæ, aperture large. Genital pore without sucker. Excretory pore in vesicular zone, in acetabular zone, postcecal, caudad of pore of Laurer's canal. Oral sucker with one (anterior) sphincter, and with a pair of well-developed evaginations; esophagus springs from ventral aspect of base of sucker and is without muscular swelling; ceca wavy, long, end postequatorial in acetabular zone.

Male organs: Testes 2, very much smaller than acetabulum, lobate, fields separate, zones coincide, considerably removed from acetabulum, preovarial, equatorial; cirrus pouch present.

Female glands: Ovary and shell gland distinctly and considerably posttesticular; vitellaria in cecal zone, from bifurcation to end of ceca, with sparsely scattered small follicles; uterus intercecal, with marked tendency to dorso-ventral slings; Laurer's canal entirely preexcretory, does not cross excretory canal or vesicle.

Eggs: Operculated, rather numerous.

TYPE SPECIES.—*Pfenderius papillatus* (Cobbold, 1882) as represented by U. S. N. M. 2554.

HABITAT.—Colon of elephants, India.

PFENDERIUS PAPILLATUS (Cobbold, 1882) Stiles & Goldberger, 1910.

[Figs. 190 to 202.]

1882: *Amphist. papillatum* Cobbold, 1882a, 240–242, figs. 10, pl. 24, fig. 11 (in *Elephas indicus*).—Braun, 1892a, 580, 663; 1893a, 874, 905; 1893d, 466.—Fischöder, 1902a, 49 (in *Elephas indicus*; India).—Sonsino, 1895, 184, 187, figs. 4–5.

SPECIFIC DIAGNOSIS.—*Pfenderius* (p. 232): Body 4.5 mm. to 5.5 mm. long, 2.5 to 2.75 mm. broad, 1.7 mm. thick; pearl tint or opaque olive green in color (alcohol specimen);

^a Based on Daday, 1907.

^b Dedicated to Dr. Charles A. Pfender, in recognition of his work on the Index-Catalogue of Medical and Veterinary Zoology.

rather conical, but bent slightly ventrad, greatest diameter between third and fourth fourth of body, attenuating gradually and considerably cephalad, slightly caudad; dorsum convex longitudinally and transversely, venter slightly convex from side to side, straight to slightly convex longitudinally; lateral margins curved both longitudinally and in transverse plane; transverse section of body transversely elliptical to circular. Genital pore in esophageal zone about one-fourth of body length from oral margin. Acetabulum terminal, with projecting margin, about 1.7 mm. in transverse, 1.4 mm. in dorso-ventral diameter, aperture directed slightly ventrad, 1.28 by 1.2 mm., cavity shallow, surface with prominent papillæ which attain 90μ long by 60μ broad at base. Mouth terminal at bluntly pointed cephalic extremity, with small papillæ; oral sucker with 2 caudal lateral bulbs, and with a well-defined sphincter about 120 to 140μ from oral margin; perisuctorial space very narrow; esophagus markedly curved dorsad, convexity ventro-caudad; ceca wavy, extend to acetabular zone, then curve slightly cephalad and terminate. Excretory pore about dorso-median, slightly caudad of preacetabular transverse plane; excretory duct almost transverse; excretory vesicle well developed, dorsal of cephalic half of acetabulum.

Male organs: Testes equatorial, ventral of ceca, fields separate, zones nearly coincide; irregularly globular, 0.4 mm.; vasa efferentia rather short, run dorso-cephalad, unite about on pretesticular plane; vesicula seminalis coiled; cirrus pouch pyriform, large, 0.44 mm. long, greatest diameter 0.32 to 0.34. mm., muscular wall 0.12 mm.; ductus hermaphroditicus present.

Female organs: Ovary posttesticular, intercecal, preacetabular, nearly or quite median, at junction of equatorial and caudal third of body; shell gland caudo-lateral of ovary; vitellaria with sparsely scattered small follicles, external, ventral, and to some extent dorsal of ceca, in cecal zone from bifurcation to end of ceca; uterus forms dilated dorso-ventral slings in suctorial field, to near cirrus pouch, then runs more directly cephalo-ventrad to ductus hermaphroditicus; Laurer's canal runs dorsally in curve (convexity caudad) in zone of shell gland, to pore slightly dextrad of median line, about 0.5 mm. cephalad of excretory pore.

Eggs: Rather numerous, elliptical, about 150 by 70μ , operculated at one pole and bearing short knob at the opposite pole.

TYPE.—Unknown. Cotypes U.S.N.M. 1721, 2554, 5777.

HABITAT.—Colon of elephant (*Elephas indicus*; India).

SOURCE OF MATERIAL.—The material consists of 7 specimens which were found in 3 bottles, as follows: 5 specimens in bottle No. 5777, 1 in bottle No. 2554, and 1 in bottle No. 1721.

The labels in these bottles bear the following data: "Name *Amphistoma papillatum*; Host *Elephas indicus*; Locality India; Determined by T. S. Cobbold; Date 1882; Presented by T. S. Cobbold; Date, 22, XII, 1882." Our material therefore represents Cobbold's original specimens.

HISTORICAL REVIEW.—Cobbold (1882a, 224, 240-242, fig. 8, pl. 24, fig. 11) originally described this species with the following diagnosis:

Body of a bright pink color, smooth, conical, bluntly pointed in front, broadly rounded off behind, with fine and regularly disposed transverse rugæ forming distinct rings in the region of the head. Caudal sucker subterminal, very large, its cup being armed with numerous large fungiform papillæ, closely set, and regularly disposed over the entire surface of the concavity. Reproductive papillæ placed well forward. Length, one-sixth to one-fourth of an inch. Breadth, one-eighth to one-seventh of an inch. Hab. Large intestine of *Elephas indicus*.

Cobbold's figure 11, drawn from a fresh specimen, shows certain anatomical details. The outline is rather different from that of our specimens. The position of the genital pore agrees fairly well, though not exactly, with its position in our material. The acetabulum and its aperture are relatively large. No indication of sucktorial evaginations is given; the esophagus is short; the ceca are long, not wavy, and end in the acetabular zone. The testes are figured as relatively much larger than those in our specimens, and as having zones which overlap slightly, fields which coincide. This latter condition does not agree with our material, which distinctly shows coinciding testicular zones and separate fields.



FIG. 190.

Braun (1892a, 580, 663; 1893a, 874, 905) refers to the papillæ in the acetabulum, to the short esophagus, and mentions the worm as a parasite in the colon of *Elephas indicus*. His

later reference (1893d, 466) merely cites the worm as a parasite of the elephant.

Sonsino (1895, 184, 187 (6, 9), figs. 4-5) figures *Amphist. papillatum* with an outline so very distinct from Cobbold's figure that a question might arise as to whether he is dealing with the same species.

Fischœder (1902a, 49; 1903h, 631) adds no new observations.

In view of the position of the testes, as figured by Cobbold, the question naturally arises as to whether we are dealing with the same or with a different species. As our material represents some of Cobbold's material, and as various authors have been misled in interpreting the relative position of the testes, especially in the case of rather thick trematodes, we hesitate to draw the conclusion that our material represents an undescribed species. Should more of Cobbold's original material be found, or should the Indian elephant prove to harbor another amphistome which agrees with Cobbold's illustration, it will then become necessary to accept the name *papillatum* for that form and to recognize our material as representing a new species.



FIG. 191.

EXTERNAL CHARACTERS.

SIZE.—The specimens, measured in alcohol, varied in length between 4.5 and 5.5 mm. and in greatest width between 2.5 and 2.75 mm. They were, however, more or less shrunken and had evidently

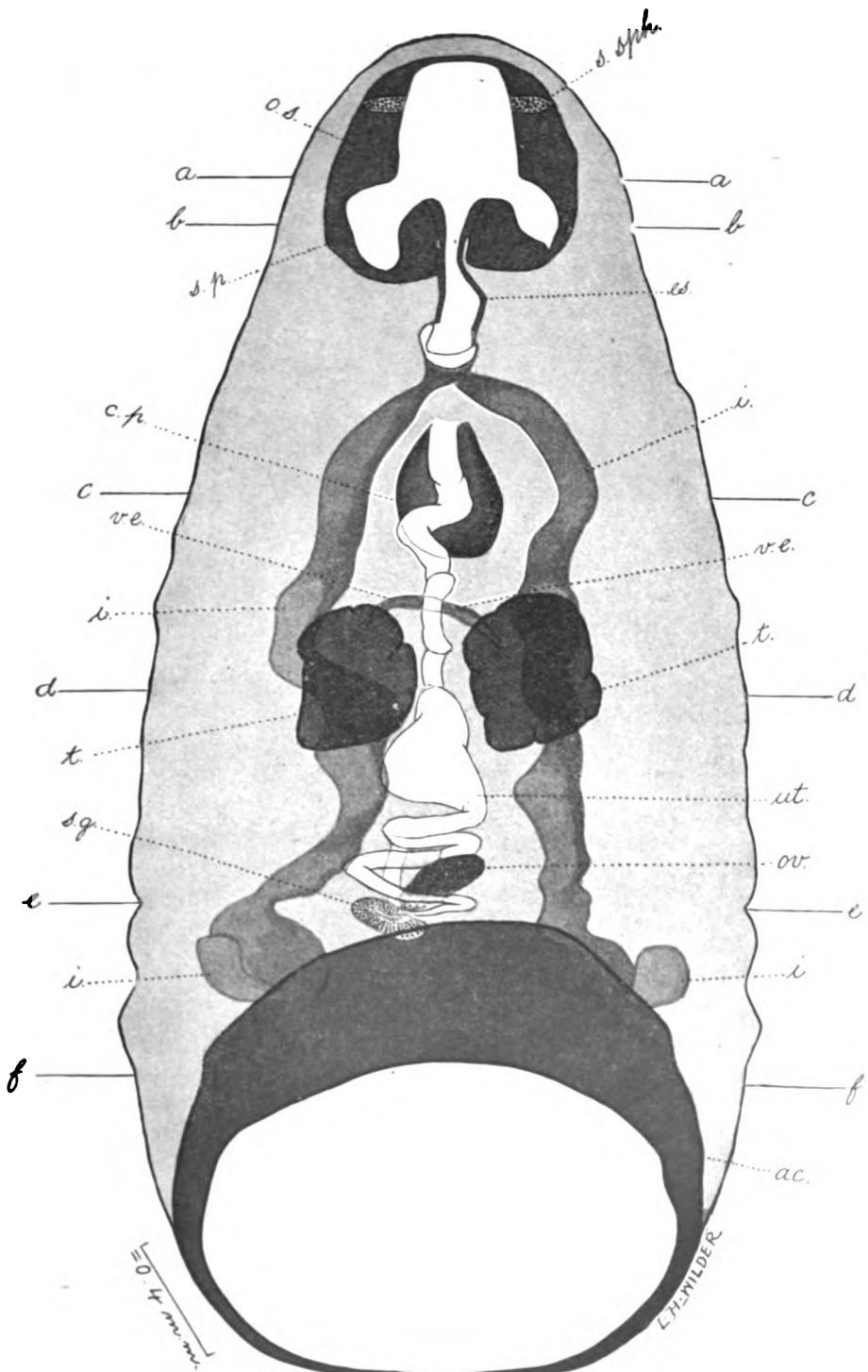


FIG 192

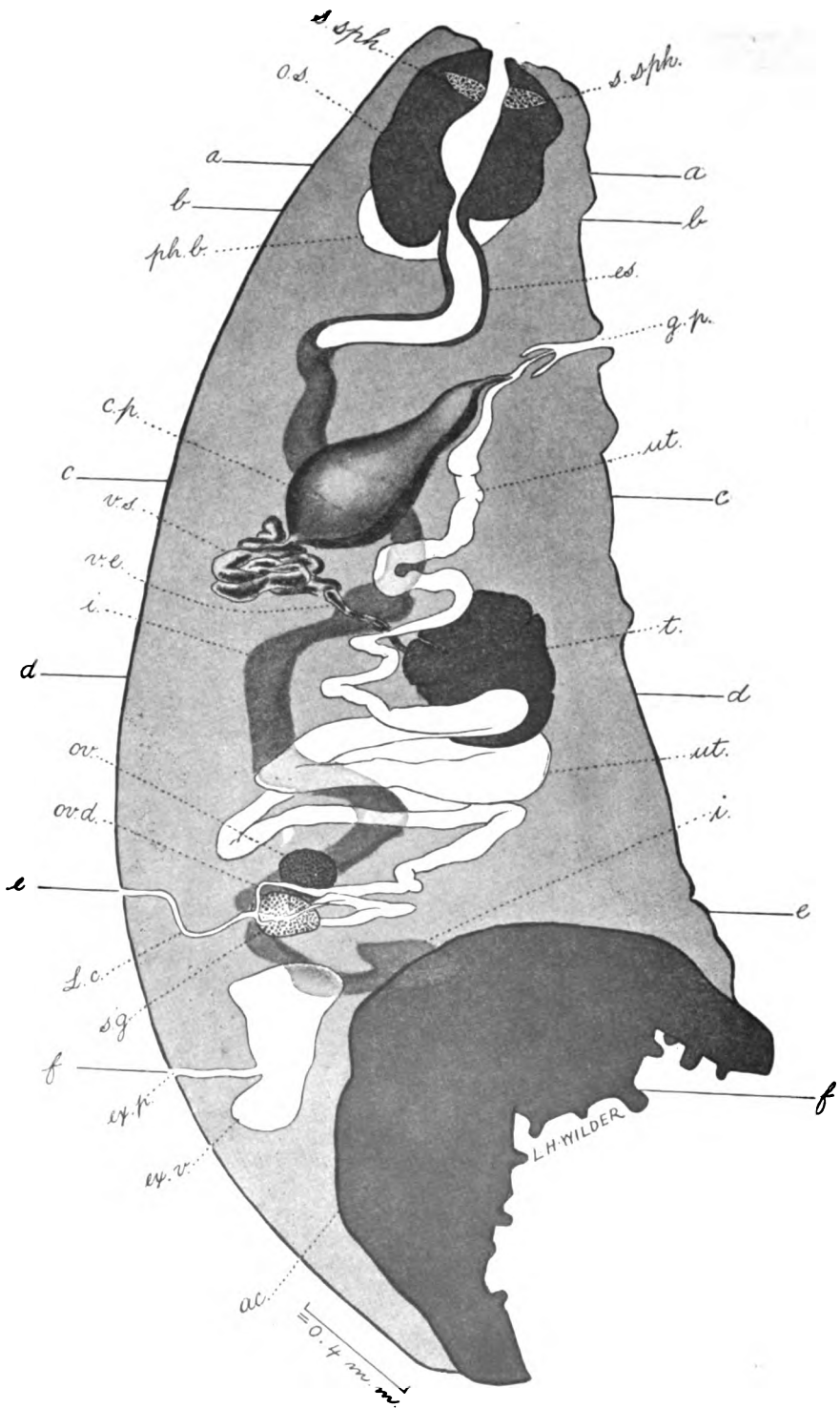


FIG. 193.

undergone some distortion, so that these measurements must be regarded only as approximations to the original.

After sectioning, one of the specimens measured 4.14 mm. in length, 2 mm. in greatest transverse, and 1.70 mm. in greatest dorso-ventral diameter.

COLOR.—Five of the specimens were of a pearl tint. These were slightly translucent, enabling the observer to determine the position of the testes. The remaining two specimens were of an opaque olive-green color.

FORM.—As has been stated, the specimens were obviously shrunken and variously distorted.

One of them, however, had undergone these changes to so slight a degree as to serve fairly well for the purpose of this description.

This worm (shown in figs. 190, 191) appeared somewhat conical in form, but bent slightly ventrad. Its greatest width was at the junction of the third with the terminal fourth of the body length.

From this region the body tapers in both directions; gradually and considerably toward the bluntly pointed oral extremity, slightly in the direction of the caudal extremity. The dorsum is arched both longitudinally and transversely; the venter is slightly convex from side to side, but straight or slightly concave in a longitudinal direction. The lateral margins are curved slightly both longitudinally and in a transverse plane. In transverse section the outline of the body is transversely elliptical to circular.

SURFACE.—The surface cuticle is without spines or scales. It is marked, however, by fine transverse striations. The bluntly pointed, attenuated extremity presents the oral aperture, which is encircled by a narrow ridge marked off from the surface by a narrow, fairly deep groove (fig. 194). Concentric with this and about equally spaced there are observed four shallow grooves (fig. 194).

Genital pore.—In the median longitudinal line of the venter, about one-fourth of the body length from the oral margin, there appears a slight, globular bulging of relatively small diameter, which presents the aperture of the genital pore. This pore leads into an elongate irregularly cylindrical chamber about 0.28 mm. long, from the fundus of which there arises a papilla, about 105μ in height and about 120μ in

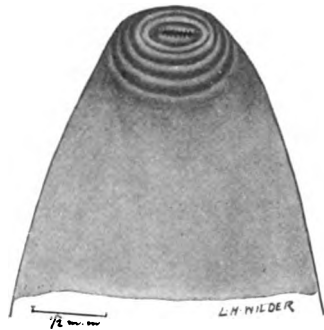


FIG. 194.

This is a black and white anatomical illustration of a cross-section through a vertebral body and its associated structures. The central feature is the vertebral body, which has a distinct outer cortical layer and a highly porous, trabecular interior. Above and below the vertebral body are the intervertebral discs, depicted as layered structures with radiating lamellae. Various ligaments are shown, including the anterior longitudinal ligament running along the anterior surface and the posterior longitudinal ligament along the posterior surface. Labels with leader lines identify specific anatomical features: 'd. dph.' at the top, 'f. v. sp.' on the left and right sides, 'O. d.' pointing to the disc space, and 'P. P. PHOSPH.' near the bottom center. A scale bar in the lower-left corner indicates a length of 10 mm.

FIG. 196.

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In transverse section the outline of the sucker is that of a blunt ellipse with its major axis in the transverse diameter of this region of the worm. Studied in median sagittal section, the base of the sucker appears slightly beveled at the expense of its ventral aspect, from which region the esophagus is seen to take its departure. On each side of and closely embracing this portion of the esophagus the caudo-lateral projections of the sucker or suctorial bulbs may be seen.

In form these bulbs are irregularly globular. Their walls, considerably thinner than those of the body of the sucker, are of relatively loose muscular mesh-like structure. The lumen of the sucker is a transversely wide, dorso-ventrally narrow space; it is

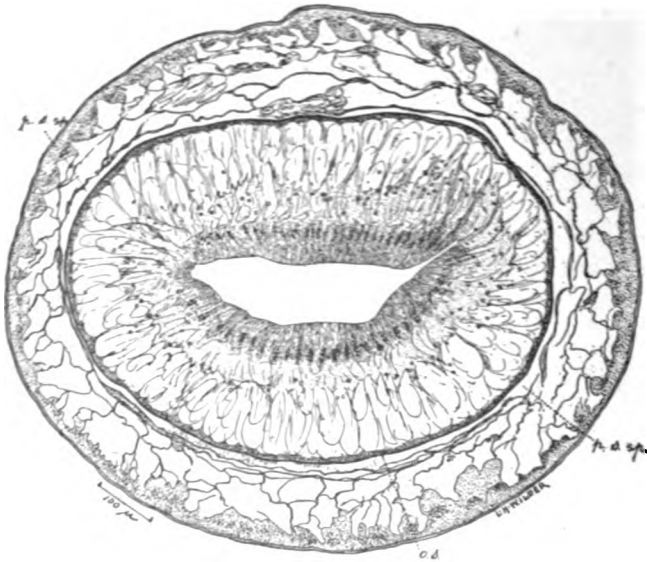


FIG. 197.

directly continuous with the irregular and variable lumen of the bulbs. Both are lined by a thin cuticle-like layer.

The esophagus, as already described, takes its departure from the ventral aspect of the base of the sucker. It passes at first caudad, describing a slight curve in its course with its convexity ventrad, then turns almost directly dorsad, and having reached a point about one-fourth the body length from the oral margin and about one-fourth the dorso-ventral diameter of the worm in this zone from the dorsum the esophagus curves directly caudad and almost immediately forks into two lateral intestinal tubes. This fork is slightly caudad of the genital pore. The intestinal tubes from their point of origin pass at first latero-caudad then in dorso-ventrally wavy course caudad. They finally terminate by bending abruptly

ventro-cephalad in a hook-like form at a point in a transverse plane slightly caudad of that of the cephalic margin of the acetabulum.

As in the other species of this group, the esophagus is inclosed in a well-marked layer of cells. The lumen of the esophagus is lined by a cuticle-like layer, which ceases abruptly at the fork. The intestines are lined by an epithelial cell layer.

GENITAL SYSTEM.—With the exception of the vitellogene glands and the testes the genital organs are situated in the intercecal area.

Male organs.—The testes are situated in the equatorial zone on each side of the median sagittal plane and ventrad of the corresponding intestine. They are irregularly globular in form, measuring about 0.40 mm. in diameter, but with their vertical diameter a little longer than either the transverse or dorso-ventral. From their

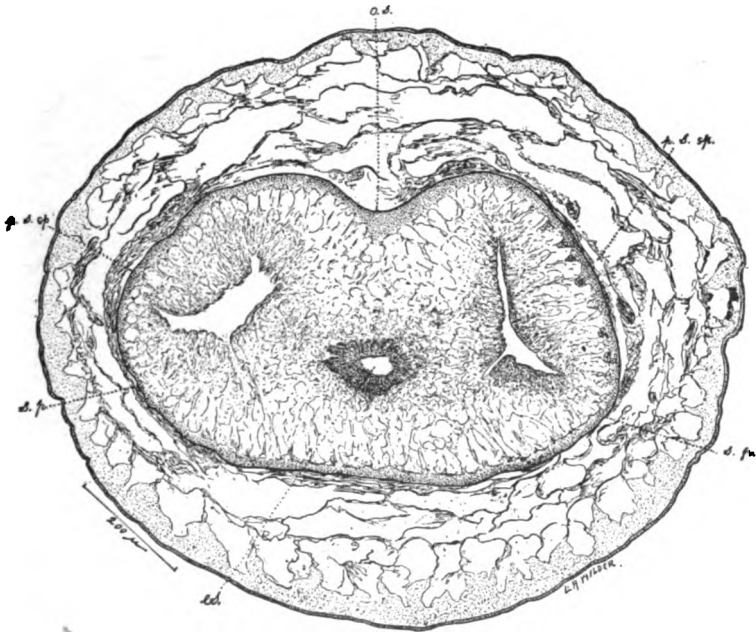


FIG. 198.

dorsal aspects, slightly above their equator, there emerges from each a vas efferens. These pass in a curved course dorso-cephalad and toward the median line to unite at about the level of the cephalic margins of the testes to form the vas deferens. The vas deferens consists first of a thin-walled, dilated, complexly coiled vesicle. This terminates abruptly in a short narrow duct, which pierces the very thick walled cirrus pouch and is continued within the latter and almost fills its lumen as a thin-walled duct (vesicula seminalis interna) to the cirrus; in a series of sagittal sections the cirrus is distinctly

seen in an invaginated condition, but with its terminal (distal) portion pointed outward (not invaginated); the canal formed by the invaginated portion unites distally with the metraterm to form a genital cloaca apparently representing a ductus hermaphroditicus, which opens on the apex of the genital papilla. The cirrus pouch is directed obliquely ventro-cephalad; in form it suggests that of an Indian club. Its walls become gradually less thick, this reduction taking place mainly at the expense of the (internal or) longitudinal layer, and its diameter becomes progressively reduced as it passes ventro-cephalad. Its greatest diameter, measured in sections, varied in two specimens from 0.32 mm. to 0.34 mm., with a thickness of wall of 0.12 mm. In length it measured about 0.44 mm. The ductus hermaphroditicus, formed as already described, pierces the axial region of the genital papilla, on the vertex of which it opens as the porus hermaphroditicus. The presence of a distinct pars prostatica can not be definitely asserted, but in two places (within at the distal end of the cirrus pouch, and without at the proximal end) are groups of nuclei which may come into consideration in this connection if well-preserved material can be obtained.

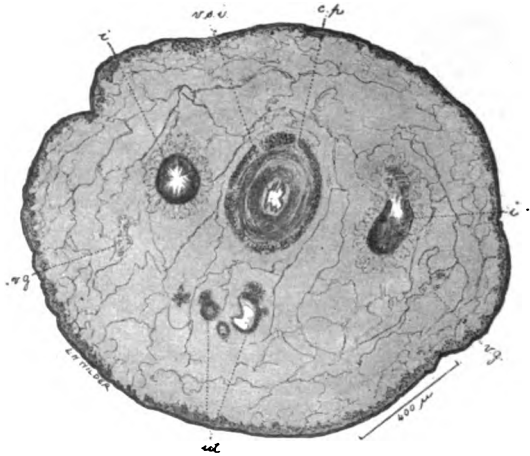


FIG. 199.

The wall of the chamber surrounding the genital papilla is provided with a well-developed muscle-complex, suggestive of the genital sucker figured by Fischöder for several species of *Cladorchis*, but the muscles are not arranged in so distinctly acetabular-like manner as Fischöder figures for the species he discusses; it therefore can not be stated that *Pfenderius papillatus* possesses a true genital sucker.

Female organs.—The ovary lies in about the median line of the body somewhat nearer the dorsum than the venter, posttesticular in a plane a little above that of the cephalic margin of the acetabulum—that is, about at the junction of the middle with the caudal third of the body. The oviduct emerges from the dorsal aspect of the ovary, passes at first directly dorsad, then curves caudad toward the dorsal aspect of the shell gland (fig. 201). The shell gland lies close to the right caudo-lateral aspect of the ovary and just at about the

level of the cephalic margin of the acetabulum. On its dorso-caudal aspect it is penetrated by the oviduct and on its caudal aspect by the vitello-duct. These ducts unite to form the ootype, the continuation of which pierces the surface of the gland and emerges from its ventro-cephalic aspect as the uterus. The uterus, immediately after its emergence from the shell gland, describes numerous compact coils in front of and to the right of the shell gland, and then, as it proceeds cephalad, to the front (ventrad of) and to the right of the ovary. Beyond this point it forms some dorso-ventral coils in the space between the ceca. These coils are dilated and filled with eggs. The uterus then continues in the axial region of the body in a more direct course cephalad. Part of its course is through the space between the caudal portions of the testes, tilting later nearer the dorsum of the body to enter the interspace between the intestines,

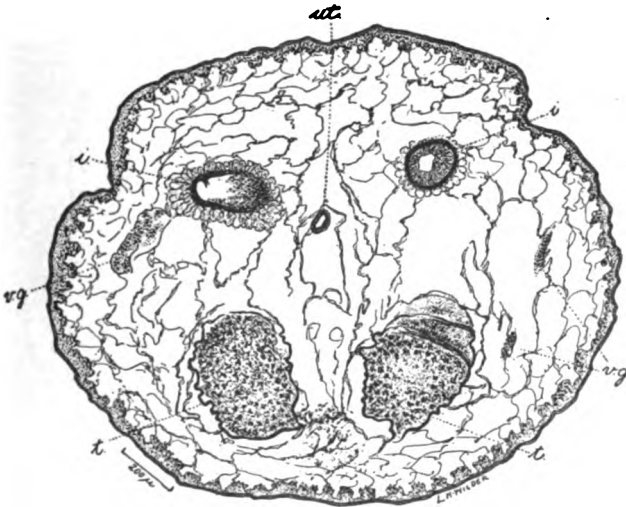


FIG. 200.

then it passes beneath the arch of union of the vasa efferentia to gain the ventral aspect of the cirrus pouch. In the remainder of its course it maintains this relation to the male duct forming but few coils, and terminates by uniting with the male duct to form the ductus hermaphroditicus.

Laurer's canal takes its departure from the oviduct at a point close to the dorsal aspect of the shell gland. It then passes dorsad describing a curve in its course with its convexity caudad and opens on the dorsum somewhat to the right of the median line about 0.54 mm. cephalad of the excretory pore in a transverse plane slightly above that of the cephalic margin of the acetabulum.

The vitellogene glands consist of sparsely scattered insignificant follicles, irregularly grouped to the external, ventral, and to some extent dorsal aspect of each of the intestinal ceca. Longitudinally they extend from about the level of the esophageal fork to the level of the cecal ends of the intestines. From each of the glands a duct passes more or less transversely inward ventrally of the intestines to unite near the ventro-caudal aspect of the shell gland. From their point of union a duct passes dorsad, skirting the caudal aspect of the shell gland which it penetrates and in the substance of which it unites with the oviduct as already described.

Eggs.—Eggs were observed crowded together in some of the proximal coils of the uterus. They appeared to be elliptical in form,

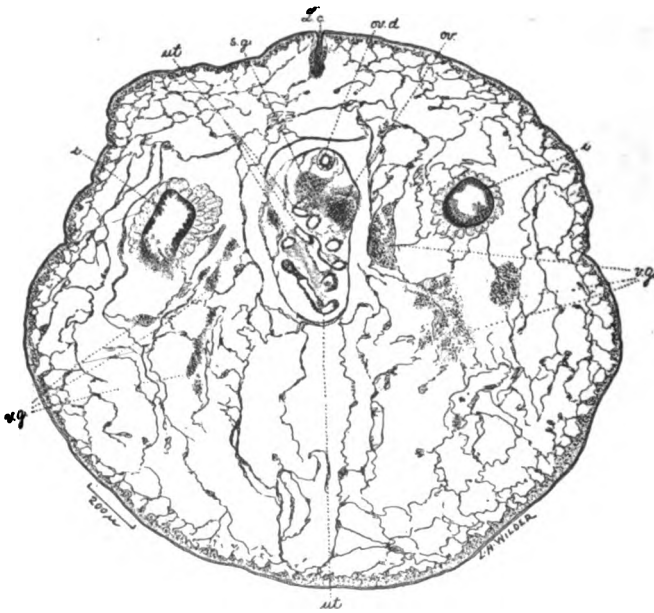


FIG. 201.

and 2 which appeared to have been sectioned in a favorable plane, measured each 150μ by 75μ in diameter. One end is operculated, and the opposite pole bears a short mammillate knob.

EXCRETORY SYSTEM.—The excretory system is well developed. An excretory vesicle of moderate size is situated dorsad of the dome of the acetabulum. From its dorsal aspect a little caudad of its equator a duct originates and passing directly dorsad opens in about the median line of the dorsum slightly caudad of the plane of the cephalic margin of the acetabular aperture and about 0.54 mm. caudad of the aperture of Laurer's canal. This excretory duct is about 0.24 mm. in length.

ILLUSTRATIONS.

FIG. 190.—Ventral view. Enlarged. Original.

FIG. 191.—Profile view of same. Enlarged. Original.

FIG. 192.—Ventral projection to show internal anatomy. *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, planes of section; *ac.*, acetabulum; *c. p.*, cirrus pouch; *es.*, esophagus; *i.*, intestine; *ov.*, ovary; *o. s.*, oral sucker; *s. p.*, suctorial pouch; *s. sph.*, suctorial sphincter; *s. g.*, shell gland; *t.*, testes; *ut.*, uterus; *v. e.*, vasa efferentia. Slightly diagrammatic. Enlarged. Original.

FIG. 193.—Profile projection of same. *a-a*, *b-b*, *c-c*, *d-d*, *e-e*, *f-f*, planes of section. *ac.*, acetabulum; *g. p.*, genital pore; *c. p.*, cirrus pouch; *es.*, esophagus; *ex. p.*, excretory pore; *ex. v.*, excretory vesicle;

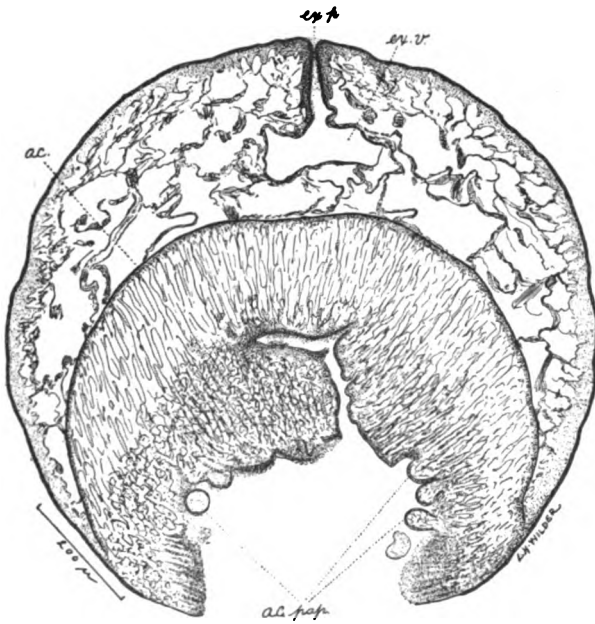


FIG. 202.

i., intestine; *L. c.*, Laurer's canal; *ov.*, ovary; *ov. d.*, oviduct; *o. s.*, oral sucker; *s. p.*, suctorial pouch; *s. sph.*, suctorial sphincter; *s. g.*, shell gland; *t.*, testes; *ut.*, uterus; *v. e.*, vas efferens; *v. s.*, vesicula seminalis. Slightly diagrammatic. Enlarged. Original.

FIG. 194.—Oral extremity seen from above and in front to show concentric grooves (slightly exaggerated) around oral aperture. Compare fig. 196. Enlarged. Original.

FIG. 195.—Sagittal section through cirrus pouch (*c. p.*). Shows also the vesicula seminalis interna (*v. s. i.*), the small cirrus (*c.*), the ductus hermaphroditicus (*d. h.*), the genital papilla (*g. pap.*), the

metraterm (*va.*), the uterus (*ut.*), a loop of the vesicula seminalis externa (*v. s.*), some loops of the uterus (*ut.*), and a section of the intestine (*i.*). Slightly diagrammatic. Enlarged. Original.

FIG. 196.—Sagittal section through oral extremity. Shows the oral sucker (*o. s.*), the suctorial sphincter (*s. sph.*), the mouth (*m.*), and the perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 197.—Transverse section at *a-a* figs. 192 and 193. Shows oral sucker (*o. s.*) and perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 198.—Transverse section at *b-b* figs. 192 and 193. Shows oral sucker (*o. s.*), the suctorial pouches (*s. p.*), entrance to the esophagus (*es.*), and the perisuctorial space (*p. s. sp.*). Enlarged. Original.

FIG. 199.—Transverse section at *c-c* figs. 192 and 193. Shows the thick muscular cirrus pouch (*c. p.*), vesicula seminalis interna (*v. s. i.*), the intestines (*i.*), uterus (*ut.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 200.—Transverse section at *d-d* figs. 192 and 193. Shows the testes (*t.*) and their relation to the intestinal ceca (*i.*) at this level, the uterus (*ut.*), and vitellaria (*v. g.*). Enlarged. Original.

FIG. 201.—Transverse section at *e-e* figs. 192 and 193. Shows caudal portion of ovary (*ov.*), cephalic portion of shell gland (*s. g.*), the oviduct (*ov. d.*), Laurer's canal (*L. c.*), some uterine coils (*ut.*), intestinal ceca (*i.*), vitellaria (*v. g.*). Enlarged. Original.

FIG. 202.—Transverse section at *f-f* figs. 192 and 193. Shows excretory vesicle (*ex. v.*) and pore (*ex. p.*) and acetabulum (*ac.*), with some of its papillæ (*ac. pap.*). Enlarged. Original.

Genus MICRORCHIS Daday, 1907.

GENERIC DIAGNOSIS.^a—*Cladorchiniæ* (p. 169): Body elongate, venter concave, dorsum convex, gradually attenuate from acetabulum to mouth, caudal end rounded (on ventral view), sides rounded. Ventral pouch absent. Acetabulum large, terminal, aperture medium, directed ventrad. Genital pore without sucker. Excretory pore prevesicular, equatorial, very close to and at left of pore of Laurer's canal. Oral sucker with well-developed sphincter and with pair of evaginations; esophagus springs ventrally from oral sucker, cephalad of evaginations, and has a distal muscular thickening, ceca straight, long, end far postovarial, but preacetabular.

Male organs: Testes 2, very much smaller than acetabulum, unbranched, somewhat irregular in outline, fields apparently overlap, zones separate, preovarial, preequatorial, far removed from acetabulum, intercecal; cirrus pouch present.

Female organs: Ovary and shell gland preequatorial, at equator of vitellaria, post-testicular; vitellaria near ceca, equatorial, nearly one-third as long as body, "branched, tree-like;" Laurer's canal prevesicular.

TYPE.—*M. megacotyle* (Diesing, 1836).

Genus CHIORCHIS Fischæder, 1901.

GENERIC DIAGNOSIS.^b—*Cladorchiniæ* (p. 169): Body straight, venter flat, dorsum convex, cephalic end attenuate, caudal end rounded, sides sharp, not divided by constriction. Ventral pouch absent. Acetabulum distinctly ventral, relatively small, extends beyond surface, margin raised, aperture large. Genital pore without sucker,

^a Based on Daday, 1907.

^b Based on Fischæder, 1903h.

ductus hermaphroditicus present. Excretory pore prevesicular, preacetabular, caudad of Laurer's canal. Oral sucker with paired evaginations; esophagus with pronounced distal muscular thickening; ceca nearly straight, end postequatorial, posttesticular.

Male organs: Testes 2, slightly smaller than acetabulum, each with 4 lobes forming cross on ventral view, fields coincide, zones separate, preovarial, in equatorial and caudal thirds; muscloses not enormous; cirrus pouch present.

Female organs: Ovary and shell gland posttesticular; vitellaria in extracecal and cecal areas, extend through part of esophageal and entire cecal zones, close to ceca; uterus intercecal; Laurer's canal, chiefly prevesicular, does not cross excretory vesicle or canal.

TYPE.—*C. fabaceus* (Diesing, 1838).

HABITAT.—Small and large intestines of marine mammals.

Genus *BALANORCHIS* Fischæder, 1901.

GENERIC DIAGNOSIS.—(*Cladorchiinae* (p. 169): Body small, rather conical, venter slightly concave, dorsum convex, cephalic end attenuate, caudal end slightly attenuate but rounded, transverse section circular. Ventral pouch absent. Acetabulum small, terminal, not sunken, margin (?), aperture relatively large. Genital pore with muscular ring; no ductus hermaphroditicus. Excretory pore postvesicular, posttesticular, apparently near cephalic margin of acetabular zone, caudad of pore of Laurer's canal. Oral sucker with paired evaginations; esophagus without muscular thickening; ceca long, slightly wavy, end postequatorial, in or near acetabular zone. Genital papilla absent.

Male organs: Testes 2, larger than acetabulum, elongate-elliptical, fields separate, zones nearly coincide, chiefly postovarial, postequatorial, close to acetabulum, cirrus pouch present.

Female organs: Ovary and shell gland in cephalic half of testicular zone; vitellaria S-shaped, following ceca, extend through nearly entire cecal zone, follicles united in globular groups; uterus slightly developed, intercecal, almost entirely pretesticular, not posttesticular; metraterm opens on caudal margin of pore, caudad of cirrus pouch.

TYPE.—*B. anastrophus* Fischæder, 1901.

HABITAT.—First stomach of *Cervidæ*, Brazil.

Subfamily *DIPLODISCINÆ* Cohn, 1904.

SUBFAMILY DIAGNOSIS.^b—*Paramphistomidæ* (p. 60): [The characters of this subfamily are still in some doubt. If the excretory system of *Diplodiscus* is characteristic for the entire group, that would make an excellent subfamily character.]

KEY TO GENERA OF *DIPLODISCINÆ*.

Acetabulum round, opens caudad, with central excavation; 2 testes in young, coalesce in adult; genital pore near mouth; esophagus long, straight, with muscular thickening ("pharynx") at bifurcation; excretory canals with dark concretions.

Diplodiscus, p. 248.

^a Based on Fischæder, 1903h.

^b *Original diagnosis*.—Amphistomiden von gedrungener, konischer Form und runden Querschnitt. Mundsaugnapf gut ausgebildet, mit 2 retrodorsalen Taschen. Ein grosser Endsaugnapf, ueber welchem dorsal der Exkretionsporus liegt. Mundöffnung terminal, Darmschenkel bis zum Endsaugnapf reichend, relativ sehr breit. Leben im Enddarm von Amphibien und Reptilien.—Cohn, 1904, 242.

Acetabulum elongate-oval, ventro-subterminal, divided into 2 parts by constriction; 1 testis; genital pore slightly postbifurcal; esophagus long, straight, with muscular thickening ("pharynx") at bifurcation; excretory canals with dark concretions.

Catadiscus, p. 248.

Acetabulum round, opens caudad, with central projecting sucker; 2 testes in adult; genital pore near mouth; esophagus short, bent, without muscular thickening ("pharynx"); excretory canals without concretions. *Opisthodiscus*, p. 248.

Genus DIPLDISCUS Diesing, 1836.

GENERIC DIAGNOSIS.^a *b*—*Diplodiscinae* (?) or *Cladorchiinae* (?) (p. 247): Body conical to cylindrical, venter concave, dorsum convex, cephalic end attenuate bluntly pointed, caudal end obliquely truncate. Ventral pouch absent. Acetabulum terminal, very large, aperture large, tilted ventrad. Genital pore without sucker. Excretory pore postvesicular, in acetabular zone, caudad of Laurer's canal; radial excretory branches profuse in acetabulum. Oral sucker with paired evaginations; esophagus with distal muscular thickening; ceca straight, long, end postequatorial, posttesticular.

Male organs: Testes 2 in young; may unite in adult, intercecal, much smaller than acetabulum, globular, unbranched, preovarial, rather distant from acetabulum, about equatorial; cirrus pouch present.

Female organs: Ovary and shell gland largely posttesticular; vitellaria extend from esophageal into postcecal zone; uterus intercecal; eggs with operculum; Laurer's canal entirely prevesicular.

TYPE.—*D. subclavatus* (Goeze, 1782).

HABITAT.—In rectum of amphibians, Europe.

Genus OPISTHODISCUS Cohn, 1904.

GENERIC DIAGNOSIS.^c—*Diplodiscinae* (?) (p. 247): Acetabulum with central projecting sucker. Esophagus without pharyngeal swelling.

Male organs: Testes 2, in part postovarial; cirrus pouch long and narrow.

Female organs: Ovary in testicular zone.

TYPE SPECIES.—*O. diplodiscoides* (Cohn, 1904).

Genus CATADISCUS Cohn, 1904.

GENERIC DIAGNOSIS.^d—*Diplodiscinae* (?) (p. 247): Acetabulum divided into 2 halves. Esophagus with distal muscular thickening.

^a *Diplodiscus* after Cohn, 1904, 242.—*Diplodiscinae*: Der runde Endsaugnapf ist nach hinten gerichtet, mit zentraler Exkavation. 2 Hoden, die bei alten Exemplaren verschmelzen. Genital porus ziemlich nahe der Mundöffnung. Oesophagus lang und gerade verlaufend, ein Pharynx an der Darmgabelung. Exkretionskanäle mit den typischen dunkeln Konkrementen.

^b Combined from various authors.

^c *Original diagnosis*.—*Diplodiscinae*: Der runde Endsaugnapf ist nach hinten gerichtet, mit centralem vorragendem Zapfen. Dauernd 2 Hoden. Genitalporus nahe an der Mundöffnung. Oesophagus kurz, um den Mundsaugnapf herum gebogen. Kein Pharynx. Die mächtige entwickelten Saugnapftaschen reichen bis zu $\frac{1}{2}$ der Gesamtlänge. Darm asymmetrisch. Exkretionskanäl ohne dunkle Konkretion.—Cohn, 1904, 243.

^d *Original diagnosis*.—*Diplodiscinae*: Der langovale Endsaugnapf liegt subterminal-ventral und ist durch Einschnüderung in 2 Theile geteilt. Ein Hoden. Genitalporus wenig vor der Körper medial, dicht hinter der Darmgabelung. Oesophagus lang, gerade verlaufend; ein Pharynx an der Darmgabelung. Exkretionskanäle mit typischen Konkrementen.—Cohn, 1904, 243.

Male organs: Cirrus pouch present. Testis single, median.

Female organs: Ovary, at least in part posttesticular.

TYPE SPECIES.—*C. dolichocotyle* (Cohn, 1903).

GASTRODISCIDÆ, new family.

FAMILY DIAGNOSIS.—*Paramphistomoidea* (p. 15): Body rather discoidal, divided by transverse constriction into cephalic and caudal portions; ventral pouch absent, venter with many large papillæ. Acetabulum ventral at caudal end.

TYPE GENUS.—*Gastrodiscus* Leuckart, 1877.

This family contains two genera (*Gastrodiscus* and *Homalogaster*), which differ so strikingly from the genera of the *Paramphistomidæ* that distinct family rank seems justified. The one point which speaks against eliminating them from *Cladorchiinæ*, *Paramphistomidæ*, is the paired evaginations of the oral sucker.

The genera may easily be separated by the following key:

Genital glands confined to large anterior portion; acetabulum moderate; type

paloniæ.....*Homalogaster*, p. 249.

Genital glands confined to large caudal portion; acetabulum small; type *sonsinoui*=

egyptiacus.....*Gastrodiscus*, p. 252.

Genus HOMALOGASTER Poirier, 1883.

GENERIC DIAGNOSIS.—*Gastrodiscidæ* (p. 249): Body divided by constriction into large cephalic, flat portion with genital glands, and small, caudal portion with acetabulum; venter flat or excavate, provided with alternating longitudinal rows of large mamma-like structures; of these, the papillæ near the middle of the rows (both longitudinal and transverse) are larger than those further from the middle; dorsum convex. Acetabulum large, caudal, ventral, not sunken, margin raised, aperture medium. Genital pore without sucker, on large protrusile papilla, ductus hermaphroditicus absent. Excretory pore postvesicular in acetabular zone, caudad of pore of Laurer's canal. Oral sucker with paired evaginations; esophagus rather long, with muscular swelling (at least in *H. philippinensis*); ceca slightly wavy, long, end postequatorial, posttesticular.

Male organs: Testes 2, smaller than acetabulum, preequatorial, lobate, widely separate from ovary and acetabulum; muscosa not enormously developed; cirrus pouch absent.

Female organs: Ovary and shell gland posttesticular; vitellaria cecal, about from bifurcation to ovary; uterus intercecal, pre-, post-, and testicular; eggs operculated; Laurer's canal entirely prevesicular.

TYPE.—*H. paloniæ* Poirier, 1883.

HABITAT.—Large intestine of ruminants. Asiatic.

HOMALOGASTER PHILIPPINENSIS Stiles & Goldberger, 1908.

[Figs. 203-205.]

A reexamination of the sectioned material that was used as the basis for the description of this species by Stiles and Goldberger, 1908, has disclosed one or two additional interesting points.

Oral sucker.—The oral sucker and suctorial pouches are inclosed in a well-marked cavity (figs. 32-36, Stiles and Goldberger, 1908). The oral sucker is held in position by attachments around its ora'

extremity and by mesenterium-like strands extending from its ventral and dorsal aspects to the parenchyma. Caudally of the base of the oral sucker similar dorso-ventral strands run from the dorso-mesial aspects of the bulbs toward the dorsum, anchoring them to the parenchyma, and other strands run ventrad from the esophagus. Besides these mesenterium-like strands, consisting of a loose parenchyma-like membrane, there are muscle bundles which attach these structures to the subcuticular muscle layers ventrally and dorsally. In this cavity or perisuctorial space is a considerable amount of a granular material (coagulum) in which a few cell-nuclei are scattered. These nuclei are surrounded by a narrow, clear, nongranular area, but a well-defined cell wall could not be made out.

Esophagus.—The caudal extremity of the esophagus is character-

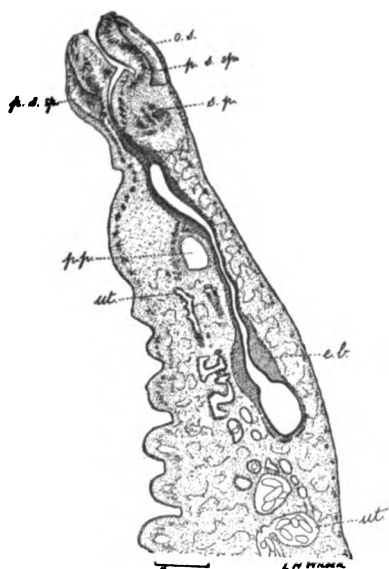


FIG. 203.

ized by a somewhat fusiform bulbous enlargement (fig. 203) due to a very marked thickening of the muscular layers. Measured in sagittal section this bulbous thickening is about 280μ long with a maximum thickness of wall of about 67μ . The thickness of the esophageal wall just above (cephalad of) the beginning of this bulbous enlargement was found to be, in the same section, about 15μ .

Acetabulum.—The rim of the acetabulum projects beyond the body parenchyma, which embraces its dome in a manner resembling somewhat that in *Pseudodiscus stanleyi*, though it is not marked off as in *stanleyi* by an encircling groove (figs. 204, 205).

The foregoing observations change the original specific diagnosis to read as follows:

SPECIFIC DIAGNOSIS.—*Homalogaster* (p. 249): Body 7.5 to 9 mm. long by 4.5 to 5 mm. (or flattened to 7 mm.) broad, canoe shaped, cephalic extremity attenuated, caudal extremity rounded; when flattened, sides very convex longitudinally; dorsum may show submedian longitudinal depressions. Genital pore 1 mm. from oral margin (about one-ninth to one-seventh of body length from mouth and about at equator of esophagus), surrounded by depressed circular area bearing numerous small papillæ. Venter with alternating longitudinal rows of large papillæ extending from about 2 to 2.5 mm. from oral margin to acetabulum. Margins curved ventrally and are fairly sharp. Acetabulum about 2.5 by 2.7 to 3 mm., its margin projects beyond the body

parenchyma. Oral sucker with a single pair of evaginations; the sucker and evaginations lie in a well-marked perisuctorial space; esophagus extends to about one-fifth of body length from oral margin; the caudal end of the esophagus is provided with a

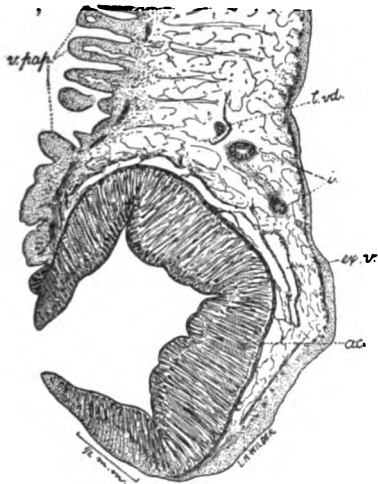


FIG. 204.

sally of testes, ventrally between vasa efferentia, ventrally of vas deferens, to pore; Laurer's canal opens dorso-median at plane of termination of ceca. Genital papilla, when extruded, resembles human penis with glans; bears on its vertex a pore, from which runs the short ductus hermaphroditicus; when retracted the papilla resembles a partially inclosed cirrus pouch.

Eggs: Egg oval, operculated, with small knob at opposite pole; 125 to 139 μ by 67.5 to 86 μ .

HABITAT.—Cecum of *Bos* sp., at Manila, P. I. (type locality), and Phrapatoom, Siam.

TYPE.—U. S. P. H. & M. H. S. 9580 (mounted); Cotypes 9581 and 9960.

ILLUSTRATIONS.

FIG. 203.—Sagittal section shows bulbous thickening of caudal end of esophagus (*e. b.*); oral sucker (*o. s.*); perisuctorial space (*p. s. sp.*); suctorial pouch (*s. p.*); pars prostatica (*p. p.*); uterus (*ut.*). Enlarged. Original.

FIG. 204.—Sagittal section of caudal extremity to show acetabulum (*ac.*). Shows also the excretory vesicle (*ex. v.*) and intestines (*i.*), section of transverse vitello-duct (*t. vd.*), and ventral papillæ (*v. pap.*). Enlarged. Original.

fusiform bulbous muscular enlargement about 280 μ long by 67 μ thick; intestinal ceca narrow, slightly tortuous, long, extending to acetabulum. Excretory pore postvesicular, dorso-median, about at equator of acetabulum, caudad of pore of Laurer's canal.

Male organs: Testes lobate in cephalic half of space between ceca; one caudad of the other; vesicula seminalis quite compactly coiled; pars musculoosa distinctly but not highly developed; pars prostatica not prominent, may enlarge to quite a large diameter, thus resembling a "vesicula seminalis interna;" ductus ejaculatorius present; cirrus absent.

Female organs: Ovary and shell gland submedian, near end of one of the ceca, ovary cephalad of shell gland; vitellaria extend about from the bifurcation of the esophagus to caudal plane of ovary; uterus with many coils, well developed, passes cephalad, dor-

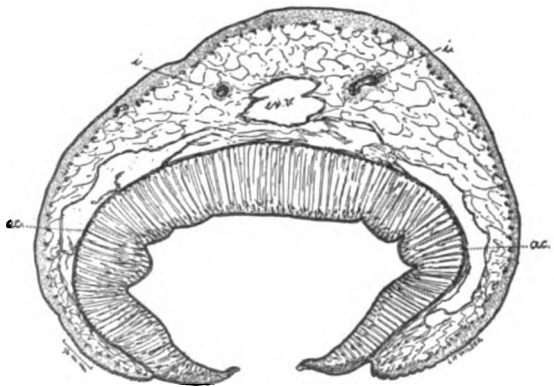


FIG. 205.

FIG. 205.—Transverse section through caudal extremity. Shows acetabulum (*ac.*), excretory vesicle (*ex. v.*), and intestines (*i.*). Enlarged. Original.

Genus *GASTRODICUS* Leuckart, 1877.

GENERIC DIAGNOSIS.^a—*Gastrodiscidae* (p. 249): Body divided by constriction into small, cephalic, slender, nearly cylindrical portion without sexual glands, and large, caudal, flat, discoidal, ventrally excavate portion containing the genital glands. Ventral pouch absent. Acetabulum small, caudal, ventral, margin raised, aperture relatively large. Genital pore without sucker. Excretory pore postvesicular, in acetabular zone, caudad of pore of Laurer's canal. Oral sucker with paired evaginations; esophagus with muscular thickening; ceca not wavy, long, end postequatatorial, posttesticular.

Male organs: Testes 2, larger than acetabulum, branched, diagonal, fields and zones overlap, preovarial, widely separated from acetabulum, about in equatorial third; musculosa not enormous; "cirrus pouch not completely closed."

Female organs: Ovary and shell gland posttesticular; vitellaria extracecal, extend from bifurcation into postcecal zone; uterus intercecal; Laurer's canal entirely pre-vesicular.

TYPE.—*Gastrodiscus aegyptiacus* Cobbold, 1876.

HABITAT.—Small and large intestines of *Equus* in Egypt and India, and *Homo* in India.

^a Based upon the writings of various authors.

LIST OF ABBREVIATIONS.

- a. ac.....aperture of acetabulum.
 a. v. p....aperture of ventral pouch.
 ac.....acetabulum.
 ac. pap....acetabular papillæ.
 c.....cirrus.
 c. p.....cirrus pouch.
 c. vd.....common vitello-duct.
 cu.....cuticle.
 d. ac.....dome of acetabulum.
 d. e.....ductus ejaculatorius.
 d. h.....ductus hermaphroditicus.
 e. g.....brain (esophageal ganglion).
 es.....esophagus.
 es. b.....esophageal bulbous thickening.
 es. f.....esophageal fork.
 ex. c.....excretory canal.
 ex. d.....excretory duct.
 ex. p.....excretory pore.
 ex. v.....excretory vesicle.
 g. a. c....ventral chamber of genital atrium.
 g. a.....genital atrium or dorsal chamber of genital atrium.
 g. b.....genital bulging.
 g. pap....genital papillæ.
 g. p.....genital pore.
 g. s.....genital sucker.
 g. sph....genital sphincter.
 i.....intestine.
 l. c.....Laurer's canal.
 m.....mouth.
 m. b.....mesenterium-like strands (of oral sucker).
 m. p.....musculosa-prostatica, junction of.
 o. pap....oral papillæ.
 o. s.....oral sucker.
 ot.....ootype.
 ov.....ovary.
 ov. d.....oviduct.
 p. i.....pars intermedia.
 p. l. c....pore of Laurer's canal.
 p. m.....pars musculosa.
 po. gr....peri-oral groove.
 por. h....porus hermaphroditicus.
 p. p.....pars prostatica.
 pap. o. s. . papillæ of oral sucker.
 p. s. sp....perisuctorial space.
 pa. gr....peri-acetabular groove.
 pap. g. a. . papillæ of genital atrium.
 par.....parenchyma.
 r. ac.....rim of aperture of acetabulum.
 s. b.....suctorial bulb.
 s. g.....shell gland.
 s. p.....suctorial pouch.
 s. pap....surface papillæ.
 s. sph....suctorial sphincter.
 sz.....spermatozoa.
 t.....testis (t. d., right or inferior t. s., left or superior).
 t. g. p....true genital pore.
 tr. gr....transverse grooves.
 t. vd....transverse vitello-duct.
 ut.....uterus.
 v. e.....vas efferens (right = v. e. d.; left = v. e. s.).
 v. e. a....arch of union of vasa efferentia.
 v. d.....vas deferens.
 v. g.....vitellogene glands, vitellaria.
 v. m.....vesicula-musculosa, junction of.
 v. p.....ventral pouch.
 v. pap....ventral papillæ.
 v. r.....vitellene reservoir.
 v. s.....vesicula seminalis.
 v. s. i....vesicula seminalis interna.
 va.....metraterm.

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By act of Congress approved July 1, 1902, the name of the "United States Marine-Hospital Service" was changed to the "Public Health and Marine-Hospital Service of the United States," and three new divisions were added to the Hygienic Laboratory.

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TREASURY DEPARTMENT
Public Health and Marine-Hospital Service of the United States

HYGIENIC LABORATORY.—BULLETIN No. 62

AUGUST, 1910

**THE TAXONOMIC VALUE OF THE MICROSCOPIC
STRUCTURE OF THE STIGMAL PLATES IN
THE TICK GENUS DERMACENTOR**

By

CH. WARDELL STILES



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SUMMARY.

The specific determination of ticks is attended in many cases with considerable difficulty. In view of the importance of these giant mites as transmitters of disease, every newly recognized character which can be utilized in classification is of value. In the present paper the microscopic structure of the stigmatal plates is shown to be a taxonomic character of considerable importance in the genus *Dermacentor*.

The species of *Dermacentor* which has been shown experimentally by King and Ricketts to act as transmitter of Rocky Mountain spotted fever in Montana is *Dermacentor andersoni*.

The tick which Salmon and Stiles (1901) considered identical with *Dermacentor reticulatus* of Europe is shown to represent a new species, *Dermacentor salmoni*.

For bibliographic references, see Stiles & Hassall, Index Catalogue of Medical and Veterinary Zoology <Bull. 39, U. S. Bureau of Animal Industry.

THE TAXONOMIC VALUE OF THE MICROSCOPIC STRUCTURE OF THE STIGMAL PLATES IN THE TICK GENUS *DERMACENTOR*.^a

By CH. WARDELL STILES, Ph. D.,

Professor of Zoology.

INTRODUCTION.

To find characters which may be readily used in distinguishing genera and species is always an interesting study for the systematist. When the group of animals in question may act as transmitters or as cause of disease, this systematic study becomes especially important, both theoretically and practically.

Since it has been shown that certain species of ticks act as transmitters of certain diseases, this group of arachnoids has been subjected to more careful study than heretofore and numerous new species have been described. To recognize these species, even when detailed diagnoses are given, as in the writings of Neumann especially, is not unattended with difficulty, and even the special student in this group is liable to fall into error in determining specimens. Every new character which can be shown to be of taxonomic value is, therefore, of practical importance at the present time, and its practical value is proportionate to its ease of application.

Salmon and Stiles (1901a, 447) indicated that the "punctuation" of the stigmal plate presented a character of value in the genus *Dermacentor*; Neumann also has used this character to a slight extent, while Banks (1908), and Cooper and Robinson (1908) have adopted it in recent papers. Since the publication of the joint paper (1901a) by Salmon and Stiles, I have become more and more convinced of the value of this character, not only in *Dermacentor* but also in some other genera. With this increased conviction a second conviction has developed, namely, that with a few exceptions the determination of the North American ticks by the usual method, namely, a study with the hand lens of an uncleared, unmounted specimen, is very likely to lead the observer to erroneous conclusions.

To give an illustration: Several years ago, I became convinced that the common tick of Montana was distinct from the form which

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Salmon and Stiles looked upon as *Dermacentor reticulatus* (= *D. salmoni*); Neumann considered that *D. reticulatus* of Salmon and Stiles was in reality Marx's *D. occidentalis*; specimens of the Montana tick were sent to Neumann, with the interpretation that they represented a new species and with the request to compare the Montana form with Marx's types which were then in his possession; with his usual courtesy, Neumann made the comparison and wrote that he agreed that the Montana ticks represented a new species; later, Neumann returned our government collection of ticks to Washington; he also sent four specimens of the European *D. reticulatus*; in the meantime I had been studying the American species of *Dermacentor* from the standpoint of the microscopic structure of the stigmal plate, and becoming thoroughly convinced that the Montana tick was absolutely distinct from what I found in the collection labeled *D. reticulatus* and what I had always supposed to be that species, I used for the Montana form the manuscript name *D. andersoni*.

Upon receiving the material from Neumann, this was reexamined, especially with reference to the microscopic structure of the stigmal plate, and this restudy resulted in some very unpleasant surprises, for instance:

(1) Neumann's four European specimens (two males and two young females) of *D. reticulatus* agree fairly well with each other in the structure of their stigmal plates; these plates are of a type very similar to that found in the American species *D. electus* seu *variabilis*. Coxæ IV of the two males show very marked variations. The palpi of one male and of one female agree fairly well in outline, but are markedly different from the palpi of the other male and the other female, while the palpi of the latter pair are of rather uniform outline. Only one specimen (a male) shows a prominent retrograde prolongation on article 2 of the palpi. One pair is not especially difficult to distinguish from the American *D. electus*; the male and female of other pair are separated from *D. electus* with somewhat greater difficulty. It seems quite clear that the American *D. electus* and the European *D. reticulatus* are exceedingly closely related. Further, both species vary so in outline of the palpi and of coxæ IV that many systematists, working on single specimens, would recognize these variations as representing several distinct species.

(2) Marx's types of *D. occidentalis*, which Neumann considered as representing a variety of the European *D. reticulatus*, are radically different from this species; they are closely allied specifically to *D. andersoni* (with which for a time I considered them identical), but they are distinct from the American form which was considered as *D. reticulatus* and which Neuman identified with *D. occidentalis*.

(3) The American form which I have always viewed as *D. reticulatus* is totally distinct from Neumann's European material of this species.

In view of this experience, it was decided to determine ticks hereafter only when the specimens could be treated with caustic and mounted in such a way as to permit the use of medium power lenses (as 8 and 4 mm.) in studying them; further, it was found that by a careful study of the stigmal plate of mounted skins there is usually but little difficulty in determining the specimens (of *Dermacentor*, at least) upon this organ alone.

The purpose of the present paper is to show the value of the stigmal plate in dividing the North American species of *Dermacentor* into four groups and in differentiating the species. A preliminary communication on this subject was published in the Proceedings of the Entomological Society of Washington, volume 9 (1-4), 1908, pages 10-11.

TECHNIQUE.

The specimens are prepared as follows: A slit is made in the caudal end of the tick, usually with a sharp knife or scissors, and in such a way as not to cut the stigmal plates; the specimen is placed in a weak caustic solution (about 2 to 5 per cent) for 12 to 96 hours, according to the condition of the material; with sharp, pointed forceps, or with a small scalpel, the entire mass of soft tissue is removed through the caudal slit; the skin is then passed through water, the alcohols, and xylol, and mounted in balsam; for pressure, a pair of cover-glass forceps, such as are in common use in bacteriological work, or a lead weight the shape of an elongated bullet, is then placed on the preparation which is now dried on a radiator, or in an oven. It is wise to examine the skin in xylol before mounting it in balsam, and during this examination legs IV are so arranged as not to cover the stigmal plates; if necessary, legs IV are removed from the skin.

Superfamily IXODOIDEA^a Banks, 1894.

It may be well to review the classification of ticks, before passing to the genus *Dermacentor*.

Ticks represent giant mites. They belong to the superfamily *Ixodoidea* of the order *Acarina*, class *Arachnida*.

Authors are, however, not yet in entire accord relative to the general classification of the group.

The superfamily *Ixodoidea* may be divided into two families, as follows:

Scutum absent; capitulum inferior in adult, terminal in hexapod larva; claws without pulvillum; palpi cylindrical; stigmal plate between legs III and IV; sexual dimorphism slight-----*Argasidae*

^a For synonymy, see Salmon and Stiles, 1901a, pp. 383-384.

Scutum present; capitulum terminal in all stages; claws with pulvillum; articles 2 and 3 of palpi usually strongly excavate in long axis on median margin, article 4 small, subterminal of article 3; stigmal plate caudo-lateral of coxæ IV; sexual dimorphism very pronounced-----*Ixodidæ*

It is particularly the family *Ixodidæ* which interests us in the present paper.

Family IXODIDÆ^a Murray, 1877.

FAMILY DIAGNOSIS.—*Ixodoidea* (p. 11): Scutum present. Capitulum terminal. Digit of mandibles provided with two articles; internal article with dorsal process; external article elongate, articulated with the internal article and bearing on its free border two to five teeth, which increase in size from the distal to the proximal. Palpi with articles 2 and 3 usually distinctly valvate in long axis on their median surface; article 4 very short in adult, as tactile appendage, situated in a ventro-terminal depression of article 3. Legs a little unequal, pair II shortest, pair IV longest; femur and tibia presenting pseudo-articulation near proximal end, except in pair I, where the pseudo-articulation is distal; tarsi with pulvillum. Stigmata dorso-caudad of coxæ IV. Genital pore ventro-median at height of coxæ I to III; a pair of sexual grooves extend from here caudad, more or less divergent, toward caudal margin. Sexual dimorphism very marked.

Male.—Usually smaller than female, flatter, often of less regularly oval contour, anterior pole being much narrower than posterior; dorsal shield covers entire dorsal surface or all but a marginal band; caudal margin ordinarily divided into eleven quadrangular festoons, distributed between the two stigmata, and often extending under the ventral surface. These represent in some cases marginal shields, the number and form of which are often variable.

Female.—At first flat, later may become very thick; dorsal shield confined to cephalic part of dorsum, remains comparatively small. Capitulum with two symmetrical porose areas, not found in larvæ, nymphs, or males.

TYPE-GENUS.—*Ixodes* Latreille, 1796.

This family may be divided in various ways, but authors are not yet entirely in accord relative to the details of the subdivisions.

Canestrini^b (1890a, 491) divided the Italian genera of this family, then known to him, into three groups, as follows:

Ventral surface of male entirely covered with shields; genus *Ixodes*.....*Poliopli*.
 Ventral surface of male with four anal shields; genera *Hyalomma*, *Rhipicephalus*.....*Tetraopli*.
 Ventral surface of male without anal shields; genera *Amblyomma* (and *Aponomma*), *Dermacentor*, *Hemaphysalis*.....*Anopli*.

This division is a very easy one to make, provided one has male specimens, but as it is based upon a secondary sexual character it is not entirely free from objection.

Neumann (1901a, 323), who recognized *Ixodidæ* s. str. as a sub-family, divided the genera of this group as follows:

Rostrum long; genera *Ixodes*, *Eschatocephalus*, *Aponomma*, *Amblyomma*, *Hyalomma*.....*Ixodæ*.
 Rostrum short; genera *Hemaphysalis*, *Rhipicephalus*, *Dermacentor*, *Rhipicephalæ*.

^a For synonymy, see Salmon and Stiles, 1901a, p. 414.

^b Original paper not accessible at present. See Neumann, 1904a, p. 446.

Salmon and Stiles (1901a, 384) divided the *Ixodidae* s. str. into two subfamilies, as follows:

- Palpi short, subtriangular, not or only slightly longer than [the two together are] broad; capitulum short; cephalic margin of body emarginate for insertion of capitulum; genera *Rhipicephalus*, *Boophilus*, *Hæmaphysalis*, *Dermacentor* *Rhipicephalinae*.
 Palpi longer than broad; capitulum long; cephalic margin of body straight or emarginate; genera *Ixodes*, *Eschatocephalus*, *Aponomma*, *Amblyomma*, *Hyalomma* *Ixodinae*.

Since 1901 several new genera have been described.

Neumann (1904a, 447) has reverted to Canestrini's classification, with some change of names, as follows:

- Ventral surface of male entirely covered with plates; anal groove surrounds anus anteriorly and is independent of genital grooves; eyes absent; rostrum elongate *Ixodeæ*.
 Ventral surface of male with two adanal plates, usually accompanied by accessory plates; anal groove surrounds the anus caudally and usually joins, anteriorly, the genital grooves; eyes present; rostrum long or short. *Rhipicephalæ*.
 Ventral surface of males without adanal plates; anal groove surrounds anus caudally and usually joins, anteriorly, the genital grooves; eyes often present; rostrum long or short. *Amblyommæ*.

A later and rather extensive division of the genera in question is that proposed by Lahille (1905a, 21-23) who accepts *Ixodidae* s. str. as a distinct family and divides the ticks as follows:

Suborder ARPAGOSTOMA [=superfamily *Ixodoidea*].

1. Capitulum inferior; scutum absent; claws without pulvillum; palpi cylindrical, nearly uniform; stigmal plates between legs III and IV; sexual dimorphism but little marked *Argasidæ*, 2.
 Capitulum terminal; scutum present; claws with pulvillum; palpal articles 2 and 3 excavate on median surface; stigmal plates caudally of legs IV; sexual dimorphism very pronoun *Ixodidæ*, 3.

ARGASIDÆ.

2. Tegument chagreened; hood does not project anteriorly of body; palpi not projecting anteriorly of body; lateral borders of body thin; ventral grooves very slightly marked; eyes absent; type *Acarus reflexus* Fabricius, 1794 *Argas* Latreille, 1795.
 Tegument mamillate (hemispherical elevations); hood projects anteriorly in form of a beak; palpi visible anteriorly, from above; lateral borders of body thick; ventral anal, preanal, and postanal grooves very marked; eyes present or absent; type *Argas savignyi* Audouin, 1827,
Ornithodoros Koch, 1844.

IXODIDÆ (based on males).

3. Anal plates absent [compare *Amblyomma* Neumann, 1904]; eyes present or absent.....*Anopli* Canestrini, 4.
 Anal plates present in pairs (4-6) [compare *Tetraopli* Canestrini, and *Rhipiccephalæ* Neumann, 1904]; eyes distinct (ommata)-----*Artiopli*, 8.
 Anal plates present in uneven numbers (as 5) [compare *Poliopli* Canestrini and *Ixodæ* Neumann, 1904]; eyes absent (anommata)----*Perissopli*, 10.

Anopli.^a

4. Eyes absent (anommata)----- 5.
 Eyes distinct (ommata)----- 7.
 5. Article 2 of palpi drawn out laterally into sharp points; type *H. concinna* Koch, 1844 -----*Hæmaphysalis* Koch, 1844.
 Article 2 of palpi not drawn out laterally into sharp points----- 6.
 6. Anal groove present; type *Ixodes gervaisi* Lucas, 1847,
Aponomma Neumann, 1899.
 Anal groove absent; type *Ixodes transversalis* Lucas, 1844,
Neumanniclla Lähille.
 7. Palpi longer than broad; type *Acarus cajennensis* Fabricius, 1787,
Amblyomma Koch, 1844.
 Palpi scarcely longer than broad; coxæ IV very large; type *Acarus reticulatus* Fabricius, 1796-----*Dermacentor* Koch, 1844.

Artiopli.

8. Palpi scarcely longer than broad; dorsal surface of base of capitulum ("prosoma") hexagonal-----9.
 Palpi longer than broad; dorsal surface of base of capitulum rectangular; type *Acarus aegyptius* Linné, 1758-----*Hyalomma* Koch, 1844.
 9. Stigmal plates circular; type *Ixodes annulatus* Say, 1821
Boophilus Curtice, 1891.
 Stigmal plates comma-shaped; type *Ixodes sanguineus* Latreille, 1804
Rhipiccephalus Koch, 1844.

Perissopli.

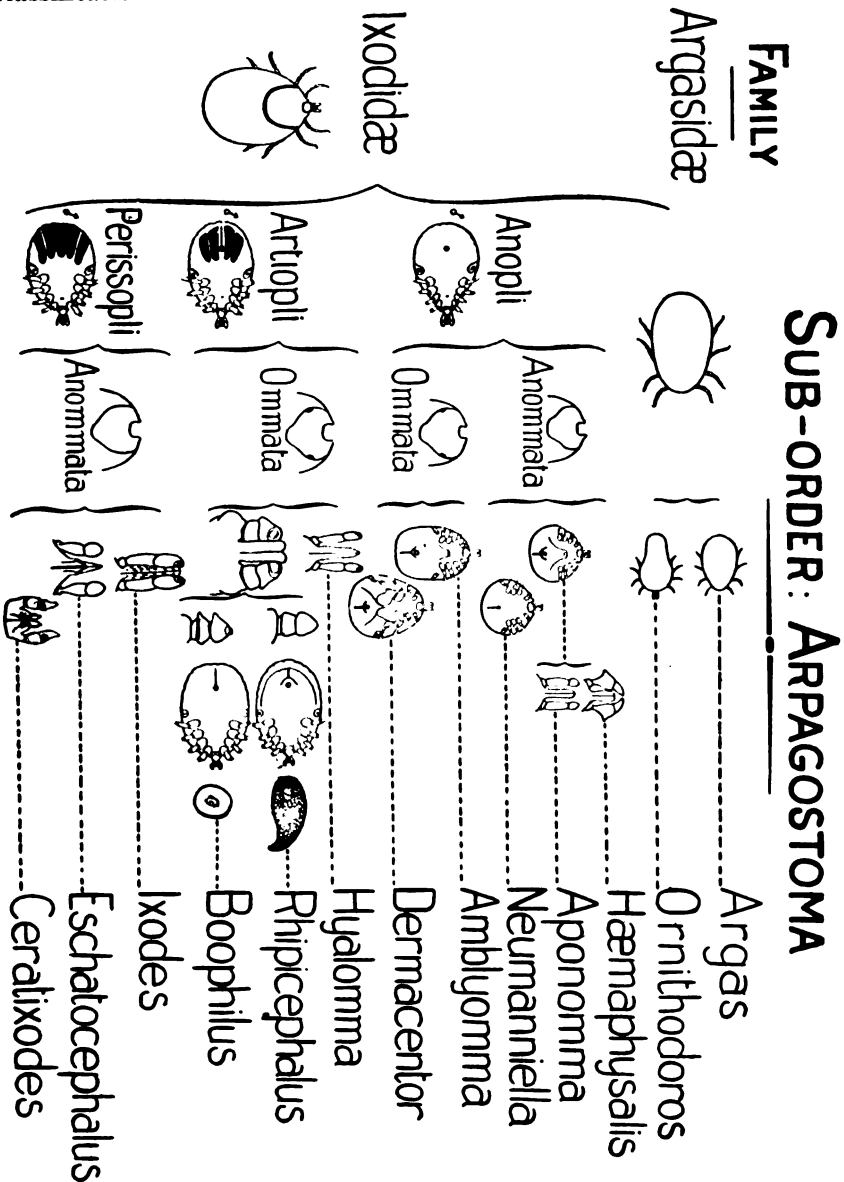
10. Palpi elongate, canaliculate; type *Acarus ricinus* Linné, 1746 [1758]
Ixodes Latreille, 1796.
 Palpi not canaliculate; type *E. gracilipes* Frauenfeld
Eschatocephalus Frauenfeld, 1853.
 Palpi pyriform; (penultimate) article 3 conical; type *Hyalomma puta* Cambridge, 1879-----*Ceratixodes* Neumann, 1902.

^a Nuttall and Warburton (1908, 398) have recently established an additional genus which would fall into this group, namely:

Rhipicentor: Male resembles *Rhipiccephalus* dorsally, *Dermacentor* ventrally. Basis capituli hexagonal with very prominent lateral angles. Coxa I strongly bifid and overlapping coxa II in male and female; male coxæ progressively increasing in size to pair IV, which is much the largest, pairs II-IV bifid. Adanal shields absent. Eyes present.

Type.—*Rhipicentor bicornis* Nuttall and Warburton, 1908, from North Nyassa, British Central Africa. Host unknown.

Lahille gives the following novel diagram in illustration of his classification :



That there are certain conveniences in this classification may be admitted, but, as Banks (1908, 13) has pointed out, the importance attached to secondary sexual characters hardly carries conviction with it, at least in our present knowledge of ticks. Banks himself has used still another division of the ticks as follows :

TABLE OF THE FAMILIES.

1. No corneous shield on dorsum; head hidden beneath front of body; anus near middle of venter; skin roughened.....*Argasidæ* 2.
- A corneous shield present on dorsum; head distinct in front of body; anus behind the middle of venter; skin only finely striated.....*Ixodidæ* 3.

TABLE OF THE GENERA.

2. Margin of body thin and acute.....*Argas*.
- Margin of body rounded.....*Ornithodoros*.
3. Venter showing a curved groove a short distance in front of the anus and extending back each side to the hind margin; no posterior marginal festoons; stigmal plate nearly circular; no ocelli; hind coxæ of male not enlarged.....(*Ixodinæ*) 4.
- Venter showing more or less distinctly a curved groove behind the anus, but none in front of it; the male with distinct marginal festoons, more or less distinct in the female.....(*Amblyomminæ*) 5.
4. Capitulum slightly angulate on the sides; palpi with the third joint shorter than broad, and broadly rounded.....*Ceratixodes*.
- Capitulum not angulate on sides; palpi with the third joint longer than broad, and slightly tapering toward the tip.....*Ixodes*.
5. Sides of capitulum angulate; ocelli present; male with anal plates; palpi very short.....(*Rhipicephalini*) 6.
- Sides of capitulum not angulate..... 7.
6. Palpi with acute transverse ridges; stigmal plate nearly circular; porose areas elliptical, distant; no distinct groove behind anus.....*Margaropus*.
- Palpi without transverse ridges; stigmal plate comma-shaped; porose areas triangular, approximate; a distinct groove behind anus.....*Rhipicephalus*.
7. Outer angle of the second joint of the short palpi acutely produced; no ocelli; male without anal plates (*Hæmaphysalini*).....*Hæmaphysalis*.
- Outer angle of second joint of palpi not acutely produced..... 8.
8. Palpi longer, second joint about twice as long as broad; coxæ IV of male not enlarged; tarsi II, III, and IV plainly divided, the basal part much shorter than the apical part (*Amblyommini*).....*Amblyomma*.
- Palpi shorter, second joint barely longer than broad; coxæ IV of male enlarged; tarsi II, III, and IV indistinctly divided, the parts subequal in length (*Dermacentorini*).....*Dermacentor*.

C. W. Howard, government entomologist for Mozambique, has (1908, August) given still another plan of division. He recognizes only one family (*Ixodidæ*) with two subfamilies (*Argasinæ* and *Ixodinæ*). The subfamily *Ixodinæ* he divides as follows:

This subfamily is divided into three tribes, the *Ixodæ*, *Rhipicephalæ*, and the *Amblyom[m]æ*.

Ixodæ.—Males clothed on all their ventral surface with shields. Anal furrow of both sexes passing around anus in front, and separate from the genital furrows; no eyes. Rostrum elongate. Includes the genus *Ixodes*.

Rhipicephalæ.—Males provided with one pair of anal shields, ordinarily accompanied by accessory shields. Anal furrow of both sexes passing around the anus behind, and usually joining the genital furrows in front. Eyes present. Rostrum sometimes long and sometimes short. Includes the genera *Rhipicephalus*, *Margaropus*, and *Hyalomma*.

Amblyom[m]æ.—Males without anal shields. The anal furrow surrounding the anus behind and usually joining the genital furrows in front. Sometimes

with eyes. Rostrum long or short. Includes the genera *Amblyomma*, *Aponomma*, *Neuman[n]iella*, *Rhipicentor*, *Dermacentor*, and *Hæmaphysalis*.

The various genera of this subfamily may be separated by the following key :

ADULTS.

- A. Males clothed on all their ventral surface with shields; anal furrow of both sexes passing around anus in front, and not joined to the genital furrows ----- (*Ixodes*), *Ixodes*.
- AA. Males with small anal plates or without, but ventral surface *not* covered with plates; anal furrow passing behind anus and usually joining genital furrows, or wanting.
- B. Males with two anal plates, usually accompanied by an accessory pair; eyes present ----- (*Rhipicephalus*).
- C. Rostrum long; palpi elongate and valvate ----- *Hyalomma*.
- CC. Rostrum short; palpi short, broad, with an outward projection on the second article.
- D. Anal groove present, stigmatic plates comma-shaped in both sexes. *Rhipicephalus*.
- DD. Anal groove absent; stigmatic plates circular or oval ----- *Margaropus*.
- BB. Males with no ventral plates; eyes sometimes present ----- (*Amblyomma*).
- C. Eyes present.
- D. Palpi long, valvate; coxæ IV not longer in male than coxæ I to III; stigmata triangular ----- *Amblyomma*.
- DD. Palpi short, thick; coxæ IV much larger in male than coxæ I to III; stigmata comma-shaped, short.
- E. Palpi very short and wider than long; coxæ IV with two long spines ----- *Rhipicentor*.
- EE. Palpi longer than wide; coxæ IV without long spines. *Dermacentor*.
- CC. Eyes absent.
- D. Palpi long; stigmatic plates comma-shaped.
- E. Body as long as wide; anal groove present ----- *Aponomma*.
- EE. Body wider than long; anal groove not present ----- *Neuman[n]iella*.
- DD. Palpi with a sharp projection outward; stigmatic plates circular or short comma-shaped ----- *Hæmaphysalis*.

NYMPHS.

(Key based on known Transvaal forms.)

- A. Anal groove surrounds the anus in front, opening posteriorly ----- *Ixodes*.
- AA. Anal groove surrounds the anus behind, opening in front.
- B. Palpi produced into a prominent lateral point ----- *Hæmaphysalis*.
- BB. Palpi more or less cylindrical.
- C. Body circular in outline; as wide as long ----- *Aponomma*.
- CC. Body longer than wide.
- D. Body narrower behind than in front ----- *Margaropus*.
- DD. Body as wide or wider behind than in front.
- E. Shield pentagonal in outline; antero-lateral edges occupying three-quarters of the length of the shield ----- *Rhipicephalus*.
- EE. Shield cordiform in outline.
- F. Eyes hemispherical ----- *Hyalomma*.
- FF. Eyes flat ----- *Amblyomma*.

(Key based on known Transvaal forms.)

- A. Body much longer than wide; narrowed at both extremities.....*Ixodes*.
 AA. Body as long as wide, or longer than wide, but widely rounded behind.
 B. Palpi produced into prominent lateral points.....*Hamaphysalis*.
 BB. Palpi more or less cylindrical.
 C. Body as wide as long; circular in outline.....*Aponomma*.
 CC. Body longer than wide.
 D. Palpi very short and thick.....*Margaropus*.
 DD. Palpi elongate.
 E. Palpi of medium length; more or less pointed at tips; dorsal shield allows a portion of the body to show along its antero-lateral edge,
Rhipicephalus.
 EE. Palpi very long; dorsal shield covers all of anterior portion of body.
 F. Eyes hemispherical.....*Hyalomma*.
 FF. Eyes flat.....*Amblyomma*.

Whatever general classification may be preferred (and the foregoing summary indicates that the last word on the subject has not yet been written), the genus which interests us at present is *Dermacentor*, which presents the following characters:

Genus *DERMACENTOR*^a Koch, 1844.

GENERIC DIAGNOSIS.—*Ixodidae* (p. 12): Caudal margin bluntly rounded. Color of capitulum and legs usually lighter than body. Dorsum: Scutum emarginate cephalad; subscapular projection present. Eyes present, usually not very prominent. Light-colored rust usually present but variable in different specimens of same species. Punctations usually large and small. Foveolæ present. Venter: Genital pore median, more or less nearly surrounded, especially cephalad, and especially in male, with large and small, prominent punctations with hairs which probably represent sexual sense organs; situated well forward in region of coxæ I or II. Anus median, caudad of plane of coxæ IV; postanal curved groove indistinct; anal ring nearly or quite circular, inclosing two lateral labia with semicircular lateral outline and straight median border, and provided with symmetrically placed hairs. *Stigmal* plates caudo-

^a Part of the characters given in this diagnosis will be found to be of more than generic value, but they are inserted here because the entire group is not under discussion.

For other, shorter, diagnoses of this genus, compare the following:

Genus *DERMACENTOR* Koch.—"Venter showing indistinctly a curved groove behind the anus, from which a median line extends to margin of body. Capitulum not angulate on sides; porose areas elliptic and transverse. Palpi short and broad, the second joint barely longer than broad and with a basal projection above, but not outward. Shield usually marked with white; ocelli present. Coxa I strongly bidentate behind; coxa IV of male much larger than other coxæ, and leg IV larger than other legs. Abdomen shows festoons behind (except in distended female). No anal plates to male. Stigmal plate large, usually reniform in female, more elongate in male. Tarsi II, III, and IV indistinctly

lateral of and usually smaller than coxæ IV; round to oval, but usually provided with dorso-lateral prolongations; usually somewhat dissimilar in outline in male and female; consist of three layers; external layer shows goblets, middle layer shows middle portion of goblets and in addition a large number of smaller supporting chitinous cells, which on surface view assume the form of a mesh-work; inner layer shows one stem to each goblet. Capitulum: Base rather rectangular, distinctly broader than long, its postero-lateral angles prolonged caudad. Hypostome spatulate, with minute terminal denticles, followed usually by three (in adults) [four in *D. nitens*] longitudinal rows of larger denticles on each half, these followed proximally by scale-like denticles which disappear first from the median, then the middle, then the lateral row. Each palpus longer than broad, but the palpi are only slightly longer than their combined breadth; extend slightly beyond hypostome; lateral margins usually convex; median surface of articles 2 and 3 strongly excavate in long axis; article 1 small, but distinct ventrally; articles 2 and 3 much longer; article 2 broadest; article 4 small, subterminal of article 3 and provided with several bristles; margins, especially ventro-median margin of articles 1 to 3, provided with bristles directed antero-medial. Legs: Coxæ increase in size I to IV; caudal margin of coxæ I strongly bifid in both sexes, the lateral outer spur narrower and usually longer than the median (inner) blade-like spur; spurs on coxæ II to IV become smaller, especially the median (inner), which may disappear from coxæ IV; trochanter I with dorso-distal retrograde blade-like projection or with prominent retrograde spinous spur; all articles of legs provided with spurs, or bristles or both, paired spurs or knobs on ventral margin may be very prominent but variable in different specimens of same species; tarsi I usually with curved terminal spur, which is better developed on tarsi II to IV; pulvillum extends beyond middle of terminal claws.

Male.—Without anal shields. Much smaller and flatter than gravid female. Sides diverge from scapulæ to maximum breadth usually near coxæ IV or stigmal plate, but divergence may be somewhat interrupted at eyes near legs II; caudad of stigmal plates, convergence usually very rapid. Dorsum: Scutum covers nearly or quite entire dorsum (except capitulum); punctations and hairs present. Cervical grooves more or less distinct; marginal groove usually fairly well marked, forms proximal border of 11 festoons; scutum usually reddish brown, with more or less rust; pseudoscutum usually present. Venter: More or less beset with hairs and pores, which are very noticeably more numerous near (especially anterior of) genital pore (probably sense organ to locate vulva). Genital pore usually between coxæ II; genital groove

divided, the parts subequal in length, and a minute tooth-like claw at apex. *Type: D. reticulatus* Fabricius.—Banks, 1908, 42.

DERMACENTOR KOCH, 1844.—“Des yeux. Base du rostre plus large que longue, rectangulaire à sa face dorsale. Palpes courts et épais. Périlrèmes en virgule courte. Face ventrale du mâle dépourvue d'écussons, semblable à celle de la femelle. Hanches de la première paire bidentées dans les deux sexes; celles de la quatrième, chez le mâle, notablement plus grandes que les autres. Ecusson dorsal ordinairement orné de dessins variés.”—Neumann, 1897a, 360.

GENUS DERMACENTOR KOCH, 1844.—“GENERIC DIAGNOSIS.—*Izodidæ*, *Rhipicephalinæ*: Eyes present. Base of capitulum rectangular, broader than long. Dorsosubmedian porose plates present. Palpi short and thick. Stigmal plate comma-shaped; short. Male without anal shields. Coxæ I bidentate in both sexes; coxæ IV of male much larger than I to III. Scutum usually ornamented. *TYPE-SPECIES*.—*Dermacentor reticulatus* (Fabricius, 1794).”—Salmon and Stiles, 1901a, 447.

usually distinct. Stigmal plate not always of same form as in female, but shows same type of goblets. Capitulum: Internal article usually with two visor-like transverse ridges (dorsal process), their free margins directed toward body. Legs: Coxæ I to IV converge toward median line; coxæ IV much larger than others, but may present a large and a small type in one and the same species or even on same specimen; tarsi II to IV with subterminal spur.

Female.—Dorsum: Scutum usually rather prominent because of rust; cervical groove usually of hourglass-like form; eyes at lateral angles. Uncovered portion of dorsum shows punctations (circular pores) with hairs; usually also a distinct median, two submedian, and a more or less distinct marginal groove. Foveolæ caudad of scutum. Venter: Punctations (pores) and fine hairs present; genital grooves diverge more or less gradually to a point about half way between coxæ IV and anus, then more markedly to margins; median, longitudinal, postanal groove usually well marked. Vulva median, in zone of coxæ II or cephalad of this zone. Capitulum: Porose areas present, but may be of somewhat variable outline in a given species.

TYPE SPECIES.—*D. reticulatus* (Fabricius, 1794) Koch, 1844, on cattle in Europe.

The specimens of *Dermacentor* now in my possession may be divided into four distinct groups according to the microscopic structure of the stigmal plates of the adult.

STRUCTURE OF THE STIGMAL PLATE.^a

The stigmal plate is a complicated structure. It will be considered here only in so far as it is of importance in differentiating the species or groups of species.

This plate varies to some extent in the two sexes, and it varies also in the different stages of development of one and the same species.

Hexapod larva.—Several authors have mentioned the presence of a stigma caudad of each coxæ III. In the hexapod larvæ which I have examined, a similar aperture is present caudad of each coxa I and II. If the aperture caudad of coxæ III is a stigma (and this interpretation is not called into question here), then the others would seem to be stigmata also; accordingly, the hexapod larva of a number of species, at least, is provided with at least three pairs of stigmata. (See also below, p. 21, for a possible fourth pair.)

These stigmata are radically different from the stigmal plates of the adults. In the hexapod of *D. andersoni* (preserved and treated with caustic), for instance, they are small apertures, slightly broader than long, about 6 by 10 μ in superficial diameter, and 12 by 16 μ (outside diameter) in deeper focus; the aperture is provided with a

^aThe publication of the present paper has been delayed some months. In the meantime Nuttall, Cooper, and Robinson (1908, December, 347-351) have published an article entitled "On the structure of the spiracles of a tick, *Hæmaphysalis punctata* Canestrini and Fanzago," in which they give results for *Hæmaphysalis* similar in many respects to those described here for *Dermacentor*.

cuticular structure which is slightly differentiated from that of the skin. Both on ventral view and on optical section, these openings are provided with a pair of transverse labial structures, seen upon deeper focus, and apparently of importance in opening and closing the aperture.

A pair of organs, in structure similar to the stigmata, is found ventro-submarginal, laterally in the transverse zone of the anus. It would seem, therefore, that whatever may be the number of stigmata present in other ticks, the hexapod stage of this species (*andersoni*) apparently possesses four pairs.

Adult.—In the adult the stigmal plate is raised slightly above the body cuticle. It varies in size and in outline, the variation, so far as noticed, in the same sex of the same species being much less than the variation, so far as noticed, between the male and female of any one species, or between different species.

In order to arrive at an interpretation of the finer structure of the stigmal plate, so far as is necessary in the present paper, it will be best to take the species formerly considered the American *D. reticulatus*. Banks (1907, 608) has identified this species with *D. albipictus* Packard, with which he also makes *D. variegatus* synonymous. Neumann identifies this form with *D. occidentalis*. It is further interesting to note that there is a specimen of tick labeled "*D. albipictus*" in the United States National Museum which is identical with *D. electus*. The citation of this confusion is not to be interpreted as even an indirect criticism of my colleagues, Neumann and Banks, but as illustrating the difficulties which are encountered in tick determination and as showing how these difficulties may be overcome, at least in part, by the method here described.

I shall recognize the species under consideration as a new species, *Dermacentor salmoni* (see p. 55).

If a transverse section of the stigmal plate (fig. 34) is prepared, or if the plate is mounted so as to show in profile, it will be seen that the plate is composed of three layers, which may be called the external, the middle, and the internal. The differences in these layers are caused by differences in the component parts. Certain large chitinous gobletlike structures are observed. The stem of the goblet is in the internal layer; the rim and the upper portion of the goblet occupy the external layer; the rest of the goblet occupies the middle layer, and is supported by smaller chitinous structures of circular to elongate form. These goblets vary in form in different species, but seem to be fairly constant in each species. Thus in *D. salmoni* the rim of the goblet presents a very broad diameter; in *D. electus* the goblet is very narrow; *D. occidentalis* and *D. andersoni* stand about midway between *D. salmoni* and *D. electus* in respect to this character.

Surface views of the plate naturally vary according to the size of the goblets, and it is this variation which I find to be so useful in differentiating the species in question.

In surface views of *D. salmoni* the three layers described for transverse section can be easily recognized (fig. 32). We notice a superficial layer of very large rings, corresponding to the rim of the goblets; focusing down to the internal layer, we find that for each large ring there is a small circle present, representing a cross section of the stem of the goblet; thus the rings in the external layer of the plate agree in number with the small circles of the internal layer; focusing to the middle layer, it is noticed that there is a somewhat funnel-shaped structure, corresponding to the lower portion of the bowl of the goblet, and the spaces between these funnels are occupied by numerous structures more or less ringlike in section, representing cross sections of the circular to elongate bodies mentioned for the transverse sections of the plate.

In *D. electus*, the rings of the external layer are very small, delicate, very numerous, but often difficult to see (figs. 3, 5); focussing to the internal layer, however, the circles (stems) are seen to be very distinct and very numerous, so that the plate exhibits quite a characteristic appearance; the funnel, so prominent in the middle layer of *D. salmoni*, is not seen on surface view, so that this layer also, in *D. electus*, presents an entirely different appearance.

In *D. andersoni*, the rings (figs. 9, 10) of the external layer stand (in reference to size) between those of *D. salmoni* and *D. electus*; the funnel of the middle layer is present, but not large; the circles of the internal layer are distinct, but less striking than in the case of *D. electus*.

In *D. nitens*, the stigmal plate (figs. 40-43) is very striking. The rings of the external layer are few in number (8 to 20), and relatively large, but they show great variation in size on any one plate and their number may vary on the right and left plates of one individual; the circles of the internal layer are not very distinct; the circles of the middle layer are distinct.

The following table gives the measurements in μ of the goblets observed in a limited number of specimens of the species discussed in this paper.

	Diameters of goblets.				Surface measurements of goblets.			
	Males.		Females.		Males.		Females.	
	Longest.	Shortest.	Longest.	Shortest.	Largest.	Smallest.	Largest.	Smallest.
Reticulatus group:								
<i>D. reticulatus</i>	19	5	16	5	19×14	7×7	17×15	7×6
<i>D. electus</i>	19	5	18	5	19×15	6×5	18×18	6×6
Andersoni group:								
<i>D. occidentalis</i>	40	13	39	15	40×30	17×14	39×30	19×15
<i>D. andersoni</i>	40	5	40	12	37×28	5×5	38×25	14×12
<i>D. venustus</i>	43	12	43	10	43×29	16×15	30×24	12×10
<i>D. parumapertus</i>			25	7			18×16	10×9
<i>D. p. marginatus</i>	32	13	30	7	25×20	17×16	30×22	10×9
Salmonii group:								
<i>D. nigrolineatus</i>	53	15	52	17	51×35	25×15	52×40	28×22
<i>D. salmoni</i>	73	26	85	26	70×45	40×30	85×58	39×26
<i>D. variegatus</i>	50	15	49	8	55×36	24×15	49×27	15×8
Nitens group:								
<i>D. nitens</i>	88	43	115	78	85×75	51×51	114×80	89×79

The aperture (macula) of the stigmal plate is of some use in determining the species, but the "chamber" into which this aperture leads is of greater value.

This chamber may be relatively small, as in *D. andersoni* (figs. 9, 10), or it may be very large, as in *D. parumapertus marginatus* (figs. 17-19).

With this general introduction in mind, we may pass to certain species of *Dermacentor*. As work in groups of parasites other than ticks has prevented me from keeping thoroughly informed on the recent extensive literature on the *Ixodoidea*, the following account should not be interpreted as representing a revision of the species of *Dermacentor*, but simply as a contribution to their microscopic anatomy.

Banks (1908, 42-51) recognizes the following North American species of this genus: *D. bifurcatus*, *D. albipictus*, *D. parumapertus*, *D. parumapertus marginatus*, *D. venustus*, *D. occidentalis*, *D. variabilis*, and *D. nitens*. These forms he distinguishes by the following key:

TABLE OF SPECIES.

1. Females..... 2.
Males..... 8.
2. Stigmal plate nearly circular, with from 10 to 20 very large more or less isolated granulations; shield without distinct punctures; color dark red-brown, without markings.....*nitens*.
Stigmal plate with many much smaller, more crowded granulations; shield distinctly punctured, and usually with some pale markings..... 3.
3. Stigmal plate about as broad as long; with short and broad dorsal prolongation, and covered with many very minute granules, scarcely visible as such; shield plainly longer than broad, and much streaked with white.....*variabilis*.
Stigmal plate with much larger granules, at least near the peritreme..... 4.
4. Stigmal plate without distinct dorsal prolongation; shield plainly longer than broad..... 5.
Stigmal plate with a more or less distinct dorsal prolongation..... 6.

5. Shield mostly white, with brown streaks and spots; porose areas close together ----- *albipictus*.
 Shield dark red-brown, with very little white; porose areas rather widely separated ----- *nigrolineatus*.
6. Shield mostly white, about as broad as long ----- 7.
 Shield without white, or but little, plainly a little longer than broad; porose areas but little longer than broad, and well separated ----- *parumapertus*.
7. Porose areas very small; stigmal plate with rather wide dorsal prolongation ----- *occidentalis*.
 Porose areas larger; stigmal plate with a more narrow dorsal prolongation ----- *venustus*.
8. Stigmal plate with from 4 to 10 very large isolated granules; dorsum without white marks; only eight impressed lines behind ----- *nitens*.
 Stigmal plate with many smaller, more crowded granules; twelve impressed lines behind ----- 9.
9. Stigmal plate about as broad behind as long, with dorsal prolongation, the granulations extremely minute; dorsum marked with white streaks and spots ----- *variabilis*.
 Stigmal plate usually plainly longer than broad; the granulations much larger ----- 10.
10. Stigmal plate without distinct apical prolongation; the sides of the body more nearly parallel ----- 11.
 Stigmal plate with distinct apical prolongation; sides of body more divergent ----- 12.
11. Dorsum mostly white, with brown streaks and spots in a pattern; hind angles of the capitulum but little produced; coxa IV about one-half as long as broad on base; large species ----- *albipictus*.
 Dorsum red-brown, with black lines, no white; hind angles of capitulum much prolonged; coxa IV not twice as broad on base as long; species of moderate size ----- *nigrolineatus*.
12. Dorsum with few, if any, white spots; coxa IV about as long as broad at base; hind angles of capitulum moderately produced ----- *parumapertus*.
 Dorsum largely white, or much spotted with white ----- 13.
13. Stigmal plate more attenuate behind; coxa IV about one-half as long as broad at base; hind angles of capitulum moderately produced ----- *venustus*.
 Stigmal plate less attenuate behind; coxa IV not twice as broad on base as long; hind angles of capitulum much produced ----- *occidentalis*.

It will be noticed that Banks has utilized the "granulations" (goblets) of the stigmal plates in a manner somewhat similar to the way Salmon and Stiles (1901a) used them. He has also placed considerable stress on the size of coxæ IV. Further, the rust and the prolongations of the stigmal plate are used in his keys.

In the present paper, greater stress will be placed upon the goblets (granulations); the rust and the stigmal prolongations may be utilized, but with reserve; the size of coxæ IV will not be given much prominence, as in my experience this is subject to extreme variation and has too frequently misled me.

D. bifurcatus from a wild cat, in Texas, is not at my disposal.

D. albipictus as interpreted by Banks represents at least two species, namely, *D. variegatus* [= *albipictus*] and *D. salmoni*.

D. parumapertus is undoubtedly a good species, but my material is not sufficient to permit as careful a study as I should wish.

D. parumapertus marginatus is present in my material.

D. venustus as interpreted by Banks contains two species, *D. venustus* of Texas and *D. andersoni* of Montana.

D. occidentalis is a good species.

D. nigrolineatus is closely allied to *D. salmoni*, but is a distinct species.

D. variabilis seu *electus* presents certain variations which may possibly prove to be of subspecific or possibly even of specific value.

D. nitens is so distinct from the other species that the probability is present that it will eventually be taken as basis for a distinct subgenus.

The following key may be utilized to distinguish the species discussed in the present paper:

KEY TO CERTAIN SPECIES OF DERMACENTOR.

1. Adults with four longitudinal rows of large denticles on each half of hypostome; stigmal plate nearly circular, without dorso-lateral prolongation, goblets very large, attaining 43 to 115 μ in diameter; not over 40 per plate, each surrounded by an elevated row of regularly arranged supporting cells; white rust wanting; base of capitulum distinctly broader than long, its postero-lateral angles prolonged slightly, if at all; coxæ I with short spurs; trochanter I with small dorso-terminal blade; (Nitens group)-----*D. nitens*, p. 63.
 Male: Stigmal plate slightly longer than broad, with 4 to 11 goblets; genital pore surrounded by numerous punctations and hairs, a double transverse row immediately caudad of pore.
 Female: Stigmal plate nearly circular, with 6 to 20 goblets; genital pore (? apparently with fewer hairs than in male).
 Adults with three longitudinal rows of large denticles on each half of hypostome; goblets small, medium, or large, always more than 40 per plate; whitish rust usually present.-----2.
2. Dorso-lateral prolongation of stigmal plate small or absent; plates of adults distinctly longer than broad; goblets large, usually 30 to 85 μ in diameter, appearing as very coarse punctations on untreated specimens, but on specimens treated with caustic they appear very distinct in outline; base of capitulum distinctly (usually about twice) broader than long, the postero-lateral angles distinctly prolonged caudad; spurs of coxæ I long, lateral spur slightly longer than median; trochanter I with dorso-terminal spur-----*Salmoni* group, 8.
 Dorso-lateral prolongation of stigmal plate distinct; body of plate distinctly longer than broad; goblets of medium size, usually 17.5 to 35 or 40 μ in diameter, appearing as medium sized punctations on untreated specimens, but on specimens treated with caustic they appear very distinct in outline, which is not usually circular; base of capitulum usually less than twice as broad as long, the postero-lateral angles always distinctly prolonged caudad-----*Andersoni* group, 4.

Dorso-lateral prolongation of stigmal plate distinct; goblets small, rarely exceeding $17.6\ \mu$, occasionally reaching $19\ \mu$ in diameter; on untreated specimens they appear as very fine granulations, and on specimens treated with caustic they may be difficult to see, but their large number can be determined from the prominent stems of the goblets; surface of outline of goblets distinctly circular; base of capitulum usually less than twice as broad as long, the postero-lateral angles distinctly prolonged caudad; spurs of coxæ I long-----*Reticulatus* group, 3.

RETICULATUS GROUP.

3. Article 2 of palpi with dorso-lateral retrograde spur, sometimes very prominent; palpi with tendency to angular sides; trochanter I with tendency to distinct dorso-terminal retrograde spur; stigmal plate with tendency to distinct elongation, especially in male, with more or less distinctly terminal prolongation, and with rather broad margin free of goblets; type locality Europe-----*D. reticulatus*, p. 28.

Male: Plate long and narrow, goblets about 375 per plate, 5 to $19\ \mu$ in diameter; genital pore surrounded by numerous large and small punctations.

Female: Plate not so long as in male, relatively broader; goblets about 200 per plate, 5 to $16\ \mu$ in diameter; genital pore surrounded by large and numerous smaller punctations.

- Article 2 of palpi with generally not very prominent dorso-median retrograde prolongation; palpi with tendency to convex sides; trochanter I with rather indistinct spur, often almost resembling a blade; stigmal plate with decided tendency to broadness, especially in female, with tendency to subterminal prolongation, and with much narrower or no margin free of goblets; goblets may attain 535 in number and 5 to $19\ \mu$ in diameter; type locality, United States-----*D. electus*, p. 29.

Male: Plate much shorter than in *D. reticulatus*, and with smaller aperture; aperture smaller than in female *electus*; about 535 goblets per plate, 5 to $19\ \mu$ in diameter; genital pore with large and small punctations.

Female: Plate usually extremely broad, with large aperture, and decidedly subterminal prolongation; about 450 goblets per plate, 5 to $18\ \mu$ in diameter; genital pore with large and smaller punctations.

ANDERSONI GROUP.

4. Trochanter I with distinct dorso-subterminal retrograde, sharp, digitate spur; postero-lateral angles of capitulum pronouncedly prolonged caudad, 112 to $160\ \mu$ long; goblets attain 13 to $40\ \mu$ in diameter; type locality, California-----*D. occidentalis*, p. 32.

Male: Stigmal plate elongate, small, with about 65 goblets, which attain 13 to $40\ \mu$ in diameter.

Female: Stigmal plate much broader, with about 70 goblets, which attain 15 to $39\ \mu$ in diameter.

- Trochanter I with dorso-subterminal blade; postero-lateral angles of capitulum with rather short prolongations;

Male ----- 5.

Female ----- 6.

5. Stigmal plate small, prolongation forming very obtuse angle with plate; goblets about 45 per plate, scattered, not covering entire plate, not angular, but nearly circular; goblets attain 44 in number, 13 to 32 μ in diameter; coxæ I with unusually short spurs, the inner considerably shorter than outer; scutum with very little rust; small species, type locality, Arizona-----*D. parumapertus marginatus*, p. 48.

Stigmal plate twice as large; broad prolongation, forming rounded, somewhat obtuse angle with plate; goblets about 75 per plate, scattered, those near aperture somewhat elongate, those in prolongation more circular, may attain 12 to 43 μ in diameter; coxæ I with longer spurs, inner slightly shorter than outer; scutum with considerable rust; type locality, Texas-----*D. venustus*, p. 43.

Stigmal plate still larger; prolongation shows decided tendency to form right angle; goblets, about 157 per plate, attain 5 to 32 or 40 μ in diameter, tendency to angularity; coxæ I with long spurs, inner slightly shorter than outer; scutum with considerable rust; type locality, Bitter Root Valley, Arizona-----*D. andersoni*, p. 36.

6. Stigmal plate small, its chamber relatively unusually large, occupying nearly entire body of plate; a portion of dorsal margin without goblets or supporting cells; goblets around aperture with unusual tendency to circular outline; about 90 goblets per plate; prolongation with few goblets; scutum with little rust; coxæ I with short spurs, the inner distinctly shorter than the outer:

D. parumapertus: Type form from Lakeside, Cal., requires further study; apparently dorsal margin of plate narrow, about 90 goblets of 7 to 25 μ diameter, prolongation shows tendency to form very acute angle, little rust in scutum-----p. 46.

D. parumapertus marginatus: Broad triangular dorsal margin of plate without goblets; goblets 73 to 90 in number, 7 to 30 μ in diameter, prolongation shows tendency to form acute angle; very little rust on scutum, chiefly present near margin; type locality Arizona-----p. 48.

Stigmal plate larger, chamber relatively smaller, does not occupy nearly all of body of plate; very little if any of dorsal margin free of supporting cells; goblets around aperture show decided tendency to angularity; scutum with considerable rust; coxæ I with long spines, inner slightly shorter than outer-----7.

7. About 105 goblets per plate, attain 10 to 43 μ in diameter, apparently absent from marginal band; requires further study; type locality Texas.

D. venustus, p. 43.

About 120 goblets per plate, attain 12 to 32 or 40 μ in diameter, absent from narrow marginal band; prolongation shows decided tendency to form an acute angle with plate; type locality Bitter Root Valley, Montana.

D. andersoni, p. 36.

SALMONI GROUP.

8. Goblets may exceed 100 in number, are crowded together, and attain 15 to 59 μ in diameter; aperture equatorial; body elongate, quite pilose, rust present; capitulum and coxæ I large; type locality North America.

D. variegatus, p. 60.

Male: Pseudoscutum distinct; goblets attain 126 in number, 15 to 59 μ in diameter.

Female: Scutum large, 1.7 to 2.1 mm. long; goblets attain 108 in number, 8 to 49 μ in diameter.

Goblets do not exceed 90 in number-----9

9. Goblets 51 to 79 in number, and 26 to 85 μ in diameter; aperture usually equatorial; body not so elongate and pilose as in *variegatus*, rust present; capitulum and coxæ I smaller than in *variegatus*; stigmal plate rather irregular in outline; type locality Oklahoma-----*D. salmoni*, p. 55. Male: Pseudoscutum not distinct; goblets 51 to 56 in number, 26 to 73 μ in diameter.

Female: Scutum large, 1.3 to 2 mm. long; goblets attain 71 to 79 in number, 26 to 85 μ in diameter.

Goblets about 70 in number, 15 to 53 μ in diameter; small species, quite pilose but without rust; capitulum and coxæ I small; type locality Adirondacks, N. Y.-----*D. nigrolineatus*, p. 51.

Male: Pseudoscutum very indistinct or absent; stigmal plate elongate with preequatorial aperture; goblets about 69 in number, 15 to 53 μ in diameter.

Female: Scutum small, 1.1 to 1.4 mm. long; stigmal plate irregularly circular; goblets 66 to 103 in number, 17 to 52 μ in diameter.

RETICULATUS GROUP.

Dermacentor reticulatus and *D. electus* [= *D. variabilis* (Say) Banks] show small goblet cells of very nearly the same size, rarely exceeding, in the cases I have thus far measured, 17.6 μ in diameter. On account of their small diameter they are not prominent, and hence they can be easily overlooked, but if a lower focus is taken the stems of the goblets (in the inner layer) come prominently into view.

DERMACENTOR RETICULATUS (Fabricius, 1794) Koch, 1844.

(Figs. 1, 2, 49, 50, 71, 82, 83, 101, 102, 120, 121.)

1794: *Acarus reticulatus* Fabricius, 1794a, 428 (host ? ; Europe).

1844: *Dermacentor reticulatus* (Fabricius, 1794) Koch, 1844a, 235.—Neumann, 1901a, 340 (names *Bos taurus* as type host; France).—Salmon and Stiles, 1901a, 448-452 in part only (namely, exclusive of American specimens and of figs. 61, 169-177).

The four specimens here taken as *D. reticulatus* are accepted as such on basis of determination by Neumann. They bear the number U. S. B. A. I. 3904, were collected in France, and represent two males and two females.

One male has a very prominent dorsal retrograde spinous prolongation on the second palpal article (fig. 49), but this is very much less evident on one female, and is not evident on the other male and female. The palpi of the male with the retrograde prolongation are very pronouncedly swollen laterally and one female agrees in this character; the other male and the other female have palpi which are much narrower. Either these palpal characters would therefore appear to be of less value than has heretofore been assumed, or ultimate investigations may show that two species are still confused in the European *D. reticulatus*; the pair without the retrograde spine is strongly suggestive of *D. electus*.

The stigmal plates are shown in figure 1 (male) and figure 2 (female).

It will be noticed that these plates are not identical in outline. That of the male is much more elongate than that of the female. They agree, however, in certain important characters, namely: The goblets present approximately the same relative distribution, being closer together near the aperture, but somewhat more separated and decidedly smaller near the periphery. Numerous (215 to 378) goblets are present, and these attain a maximum diameter of 19μ , but the peripheral goblets may be as small as 7μ .

The longest diameter of the male plate is 848μ ; the greatest breadth 480μ . The length of the female plate is 656μ ; its breadth is 464μ .

If it should eventually develop that the present *D. reticulatus* of Europe contains two species, the name should be confined to forms with stigmal plates as here described and with a prominent dorsal retrograde spinous prolongation on the second palpal article.

Neumann has designated *Bos taurus* as type host and France as type locality for this species.

DERMACENTOR VARIABILIS (Say, 1821) Bank, 1907=DERMACENTOR ELECTUS Koch, 1844.

(Figs. 3-6, 51, 52, 72, 84, 85, 103, 104, 122, 123.)

1821: *Ixodes variabilis* Say, 1821, 77.

1844: *Dermacentor electus* Koch, 1844a, 235 (type locality, Pennsylvania); 1847a, 109, pl. 22, figs. 83-84.

1907: *Dermacentor variabilis* (Say, 1821) Banks, 1907, 608; 1908, 49-50, pl. 7, figs. 3-4, 6, 8, pl. 10, figs. 3-4.

As basis of this species I have taken a series of specimens determined as *D. electus* by Neumann. Some of these were determined independently as *D. electus* by myself and agree with the form which Salmon and Stiles (1901a, 455-456, figs. 186-214) published under this name.

Banks (1907, 608; 1908, 49-50) makes this species identical with Say's *Ixodes variabilis* 1821, and he adopts the name *D. variabilis*. Banks informs me that this identification is based upon comparison of descriptions, not upon comparison of types. Personally I have formed no opinion as yet upon the correctness of this synonymy. The form which I here discuss is *D. electus*; if Banks is correct in his view, Say's specific name takes priority.

The stigmal plates of *D. electus* [= *D. variabilis* (Say) Banks] are very similar, in respect to the size of the goblets, to those of *D. reticulatus*, although the distribution of the goblets is somewhat different, and the outline of the plates also presents marked differences.

The male plate is not so pronouncedly elongate as the male plate of *D. reticulatus* and in the female plate the "comma" is more equatorial while in the female *D. reticulatus* it is nearly terminal.

It will be noticed in figures 3 and 4, of the male plate, that the tail of the "comma" is nearly terminal.

Comparing the plates of *D. electus* with those of *D. reticulatus*, it will be noticed that the goblets are more numerous, and more generally distributed in the former and extend quite to the periphery of the plate, while in *D. reticulatus* they do not attain the periphery. In some specimens of *D. electus*, considerable variation was found in respect to this point.

In *D. electus*, the goblets are 455 to 536 in number, may attain $16\ \mu$ or even $19\ \mu$ in diameter. It is, however, often quite difficult to see the upper portion of the goblets (figs. 3 and 5) although it is very easy to see the lower stems (fig. 4) which naturally give a clear idea of the distribution; these stems may attain 5 to $6\ \mu$ or even $8\ \mu$ in diameter.

The chamber under the breathing pore is relatively small, elongate, and near the ventro-median margin of the plate. The plates may attain 608 to 672 μ long by 420 μ broad in the male, and 512 to 752 μ long by 480 to 640 μ broad in the female.

In connection with the foregoing observations the following specimens have been examined:

- U. S. B. A. I. 2131, from skin. Examined by Neumann in connection with his revision of ticks and recognized as *D. electus*.
- U. S. B. A. I. 2156, collected by Cooper Curtice and determined by him as *D. americanus*; reexamined by Chapman and determined as *D. electus*.
- U. S. B. A. I. 2157, collected by Dr. B. G. Wilder, from *Canis familiaris* at Siasconset, Nantucket, Mass., July, 1889; determined by Neumann as *D. americanus* [= *electus*].
- U. S. B. A. I. 2158, collected by Hassall, July 12, 1892, from *Canis familiaris*; determined by Neumann, February 4, 1897, as *D. americanus* [= *electus*].
- U. S. B. A. I. 3011, collected in 1898 from *Bos taurus*, at St. Joseph, Mo.; determined 1901 by Stiles as *D. electus*.
- U. S. B. A. I. 3150, collected May 25, 1899, by Mrs. R. E. Miller, from *Canis familiaris*, at Joppa, Md.; determined 1899 by Stiles and Hassall as *D. americanus* [= *electus*].
- U. S. B. A. I. 3205. Stigmal plate of unusual outline.
- U. S. B. A. I. 3233, collected in 1901 by W. S. D. Haines, from *Canis familiaris*, at Joppa, Md.; determined 1901 by Stiles as *D. electus*.
- U. S. B. A. I. 3403, collected May, 1902, by Ephriam Cutter, from *Canis familiaris*, at West Falmouth, Buzzards Bay, Mass.; determined 1902 by Stiles as *D. electus*.
- U. S. B. A. I. 3518, collected July 3, 1903, by Dr. J. R. Mohler, from *Canis familiaris*, at Washington, D. C.; determined July 3, 1903, by Ransom as *D. electus*.
- U. S. B. A. I. 3520, collected August, 1903, by J. S. Jackson, from *Bos taurus*, at San Luis Obispo, Cal.; determined by Ransom as *D. electus*.
- U. S. B. A. I. 4037 (from 2126), collected October, 1890, by Cooper Curtice, from *Bos taurus*, at Albany, Tex.; determined by Neumann as *D. electus*.

- U. S. B. A. I. 4138, collected from *Bos taurus* in Maryland; determined June 15, 1905, as *D. electus*.
 U. S. B. A. I. 4360, collected from wild cat, California.

The following specimens bear numbers of the U. S. P. H. & M. H. S.:

- U. S. P. H. & M. H. S. 9746, female belonging to U. S. Nat. Mus. (old number 2381), from (? S. C.) Birdslee, Gainsville, Ohio, July 5, 1883; determined January 4, 1906, by Stiles as *D. electus*.
 U. S. P. H. & M. H. S. 9758, female belonging to U. S. Nat. Mus. (old number 5760); determined by Stiles as *D. electus*.
 U. S. P. H. & M. H. S. 9773, male belonging to U. S. Nat. Mus. (no number); collected in Virginia, June 12, 1881.
 U. S. P. H. & M. H. S. 9781, male belonging to U. S. Nat. Mus.; original label reads "506, swept from grass, Coney Island, L. I., J. L. Zabriskie, 27. V. 1891; *Ixodes albipictus* Pack.;" the determination was apparently made by Ashmead; redetermined *D. electus* by Stiles.
 U. S. P. H. & M. H. S. 9920, collected August 17, 1905, by S. Goes, from *Canis familiaris*, at Gurley, Tex.; determined by Stiles.
 U. S. P. H. & M. H. S. 10624, locality and host unknown.

The following specimens are from Marx Collection (now in the U. S. Nat. Mus.); they were determined by Marx, and later redetermined by Neumann as *D. electus* or *D. americanus*:

- Marx 123, from Mexico.
 Marx 124, host *Canis familiaris*; Nantucket.
 Marx 125, host panther; Florida.
 Marx 126, host *Canis familiaris*; D. C.
 Marx 127, host *Canis familiaris*; D. C.
 Marx 128, host *Canis familiaris*; one specimen, from Labrador. So far as can be judged from unmounted material, the determination seems to be correct.
 Marx 130. Minnesota. Same as preceding number.
 Marx 131. Alabama. Ditto.
 Marx 132. Alognakig, Alaska. Ditto.
 Marx 133. Host *Canis familiaris*; Nantucket.
 Marx 134. Host *Equus caballus*; Kansas.
 Marx 136. San Jacinto, Cal.
 Marx 140. Host and locality not given. Examined by Neumann, but apparently not by Marx.
 Marx 141. Ditto.

As already indicated, the foregoing specimens present considerable variation in certain characters, and it is by no means excluded that the American *D. electus* will eventually be subdivided into several distinct species or subspecies. Our material does not contain a sufficient number of specimens from any one given locality to enable us to conclude safely whether the variations noticed are individual or specific.

ANDERSONI GROUP.

We now pass to a group in which the goblets are of medium size, usually varying from about 17.6 to 35 μ or 40 μ in diameter.

DERMACENTOR OCCIDENTALIS Marx, 1892.

(Figs. 7, 8, 53, 54, 73, 86, 87, 105, 106, 124, 125.)

1892: *Dermacentor occidentalis* Marx in Curtice, 1892g, 226 (on *Bos taurus*; California), 234 (on cattle, deer, dog, and man); 1892i, 237.—Banks, 1907, 608; 1908, 47-48, pl. 8, figs. 1-2.—Morgan, 1899a, 134.—Neumann, 1897a, 365 (as syn. of *D. reticulatus*); 1905d, 235 (var. of *D. reticulatus*).—Railliet, 1893a, 714.—Salmon and Stiles, 1901a, 449 (syn. of *D. reticulatus*).

1905: *D. reticulatus occidentalis* (Marx, 1892) Neumann, 1895d, 235-236.

Not: *D. occidentalis* of Montana, mentioned in connection with Rocky Mountain Spotted Fever.

SPECIFIC DIAGNOSIS.—*Dermacentor* (p. 18): ♂ and young ♀: Caudal margin nearly semicircular. Color (alcohol specimens) light to dark reddish-brown, except for rust on scutum; capitulum and legs lighter. Dorsum: Eyes not prominent. Scutum with whitish rust (alcohol specimens) punctations large and small. Venter: Genital pore surrounded by numerous hairs (♂) which are much less prominent and less numerous in female than in female of *D. andersoni*. Anal ring circular or slightly broader than long, diameters vary between 192 and 272 μ . Stigmal plates with prominent dorso-lateral prolongation, which shows a tendency to form at the caudal margin of the plate a broadly rounded obtuse angle in the male and an acute angle in the female; aperture elongate, relatively not quite so long as in *D. andersoni*; goblets of medium size, attain about 32 μ , exceptionally 40 μ , in diameter, are closely set, but may be not so closely set as in *D. andersoni*, and occupy nearly entire surface except margin and distal portion of prolongation; meshes of middle layer about 9 μ in diameter; stem of goblets about 5 to 6 μ in diameter. Capitulum: Posterolateral projections of base long and prominent, giving to posterior margin (especially of male) a prominently concave line. External article, see male. Hypostome, each half with a number of minute subterminal denticles, followed by three rows of larger denticles, followed proximally by smaller scale-like denticles. Palpi, lateral margins somewhat convex, but for part of the distance nearly straight; four to five strong bristles on ventro-median margin of article 1; article 3 not distinctly triangular dorsally, may even appear rather quadrangular; few bristles on concave margin of dorso-terminal portion, terminal bristles present; an indication of a dorso-retrograde prolongation at postero-median angle of article 2. Legs: Lateral (outer) spur of coxæ I longer than the median (inner) spur; trochanter I with strong and very prominent sharp retrograde spur; spurs or knobs on ventral margins of femur IV, tibia III-IV, and protarsus IV, variable in different specimens, see male; tarsi I with very small terminal spur.

Male.—Length, 3.68 to 4.5 mm. (exclusive of hind legs); greatest breadth, 2.0 to 2.56 mm. Body, oval; unmounted specimens attain 0.8 to 0.86 mm. broad at scapulæ, specimens mounted under pressure may measure up to 0.88 mm. at this point; the sides diverge from here until they reach their maximum diameter at coxæ IV to anterior margin of stigmal plate, where they vary from 2.0 to 2.56 mm. in unmounted specimens. Dorsum: Scutum covers nearly or quite entire dorsum (except capitulum); scapulæ project 0.20 to 0.32 mm. from border of excavation; cervical grooves much more distinct anteriorly than posteriorly; marginal groove rather indistinct; scutum reddish brown, nearly covered with thin rust; pseudoscutum distinct but not very prominent, extending about 0.40 of length of scutum in median line; red spots not so prominent (alcohol specimens) as in *D. andersoni*, and rather variable, the

most prominent are: (a) Four short spots arranged radially or nearly so, from caudal margin of pseudoscutum; (b) two spots back of these; (c) a narrow elongate median and two shorter somewhat elongate submedian spots; (d) the forked spot somewhat indistinct, may also be nil; dorso-marginal spots very variable, several may be seen each side or they may be very indistinct; the rust on the eleven distinct postero-marginal festoons exceedingly variable; numerous small and a few larger punctations present; minute hairs issue from many of these punctations. Foveolæ a short distance caudal of pseudoscutum, dorsal of or near median margin of coxæ IV, and measuring 48 to 64 μ or even 80 μ in diameter; in one case, one foveola was divided into two. Venter: Ventral surface sparsely beset with hairs which, with the circular pores through which they pass, are noticeably more numerous around the genital pore. Genital pore between coxæ II; genital groove distinct. Stigmal plate 0.320 to 0.512 mm. long (through the aperture); 0.256 to 0.440 mm. broad (including prolongation); 0.40 to 0.56 mm. from antero-median margin to tip of prolongation; goblets may attain about 65 in number and 13 to 40 μ in diameter. Capitulum: 0.46 to 0.688 mm. long; base 0.40 to 0.528 mm. broad, and 0.224 to 0.30 mm. from posterior margin to anterior margin of portion over palpi; postero-lateral prolongations 112 to 160 μ in length, rather sharp. Mandibles 0.768 to 0.832 mm. long; digit 112 to 128 μ long; external article with proximally, rather large recurved tooth, a small subapical tooth, and an exceedingly small, almost invisible apical tooth; dorsal process of internal article elongate transversely with two visor-like transverse ridges, similar to *D. andersoni*. Hypostome with seven to eight large denticles in each row. Palpi 0.40 to 0.432 mm. long, each palpus 208 to 272 μ in maximum breadth; article 2 with four to five bristles on ventro-median edge; article 3 with one to two bristles on ventro-median edge. Legs: Coxæ IV present two types; they may be relatively short or long; tibia III, and femur, tibia, and protarsus IV provided with a double row of three prominent ventral knobs or spurs, especially large on tibia IV; femur IV also with a small additional ventral pair of spurs; tarsi I with terminal recurved spur, variable, may be practically nil, or may be rather well developed; tarsi II to IV with subterminal spur, variable in different specimens.

Young female.—Length 4.0 to 4.25 (exclusive of hind legs: with hind legs extended may attain 5.5 mm.); greatest breadth 2.37 mm. Body elongate oval; unmounted specimens 0.91 to 0.99 mm. broad at scapulæ, specimens mounted under pressure may measure up to (?) at this point; the sides diverge from here to a maximum breadth about at coxæ IV to stigmal plate. Dorsum: Scutum covers 0.40 to 0.46 of length of body (exclusive of head); 1.31 to 1.56 mm. long in median line; 1.5 to 1.7 mm. broad at lateral angles; quite prominent because of its whitish rust; scapulæ project about 0.22 to 0.28 mm. from border of excavation, which is somewhat convex cephalad; from shoulders, the sides of scutum diverge in distinctly curved convex lines to lateral angles, then converge rapidly in nearly straight lines to the rounded postero-lateral angles, when they converge more rapidly, and form a bluntly rounded posterior angle. Cervical grooves decidedly deeper anteriorly than posteriorly, each forming mediad the concave side of an hourglass, but inclining to a curved rather than a straight line; because of the depth of these grooves anteriorly the antero-median field is very prominent and rather raised; the distal diverging portion may be paralleled laterally by an indistinct dark line; rust not so thick in antero-median field as elsewhere, and absent from a portion of the margin caudad of lateral angles. Eyes convex, distinct, but not prominent, at lateral angles; translucent in cleared specimens. Uncovered portion of dorsum shows numerous finer punctuations (circular pores) with minute hairs and fewer

coarser punctations (circular pores); also a distinct median, two submedian grooves, and distinct marginal groove limiting the 11 postero-marginal festoons. Foveolæ 72μ in diameter, a short distance caudad of scutum. Venter: Punctations and fine hairs present; genital grooves diverge gradually but regularly to a point about half way between coxæ IV and anus, then more markedly to margins; median postanal groove distinct. Stigmal plate 0.36 to 0.384 mm. long (measured through aperture; one specimen); breadth (including prolongation) about the same; goblets may attain about 70 in number, and 15 to 39μ in diameter. Vulva between coxæ II. Capitulum: 0.656 to 0.72 mm. long; base 0.576 to 0.656 mm. broad, and 0.23 to 0.27 mm. from posterior margin to anterior margin of portion over palpi; postero-lateral prolongations 112μ long (one specimen), bluntly pointed; porose areas do not meet in median line. Mandibles?; external article apparently as in male; dorsal process of internal article apparently as in *D. andersoni*. Smaller anterior denticles of hypostome confined to smaller area than in male; eight to ten large denticles in each row; proximal denticles not so small as in male. Palpi 0.528 to 0.560 mm. long; 208 to 272 mm. broad; article 2 with six, article 3 with two to three bristles on ventro-median edge. Legs: Coxæ I to IV diverge slightly from median line; knobs and spurs on tibia III, and on femur, tibia, and protarsus IV not so well developed as in male; tarsi I with very small terminal spur which may be almost nil; tarsi II to IV with terminal spur, also with small ventral knobs.

Replete female.—One specimen, partially replete. Length, 6.5 mm.; maximum breadth, 4 mm.; legs I lateral of scutum. Venter: Vulva has shifted slightly forward of coxæ II. Legs: Coxæ farther apart than in young female, due to repletion.

TYPE.—Marx 119, U. S. Nat. Mus.

HOSTS.—Deer, cattle, dogs, and man; California.

Curtice (1892g, 226, 234) gives, in regard to this tick, the following statements:

P. 226: "*Dermacentor occidentalis* Marx in MSS., the cattle tick of California. This cattle tick is like *D. americanus* [= *electus*], but is somewhat smaller; the head shield of the female is decidedly whiter, the shield of the male being nearly white with small symmetrically situated dark spots toward either side."

P. 234: "*Dermacentor occidentalis* Marx, MS. This California species, the one ordinarily found on deer, cattle, and dogs, was quite annoying to me during the past season. They get on one while passing through the chaparral and arriving at the base of the hair insidiously insert their beak into the skin."

Later, Curtice (1892i, 237) merely mentions "*D. occidentalis* Marx, the western deer tick," as having been taken on cattle.

Morgan (1899, 134) refers to "the deer tick (perhaps *Dermacentor occidentalis*)" as being recognized as distinct by hunters in Louisiana. A legitimate doubt may arise as to whether the Californian species occurs in Louisiana.

Neumann (1897a, 365), on basis of an examination of males and females, collected "sur le Daim" in California, and labeled by Marx as *D. occidentalis*, considered this form identical with *D. reticulatus* of Europe. Later, Neumann (1905d, 235-236) reexamined these specimens and recognized them as a subspecies, *D. reticulatus occidentalis*. Through error he identified with this form the American

D. reticulatus of Salmon and Stiles. He gives the following characters for Marx's specimens:

Base of rostrum a little broader, with posterior angles very much prolonged backward. Hypostome with six rows of denticles. Various prominences of the palpi slightly pronounced. Granulations (here=goblets) of the peritremes (=stigmal plates) much more apparent. Coxæ II-IV with longer spine.

Male.—Coxæ IV sometimes prolonged caudad to the anus.

Female.—Dorsal shield relatively longer. Porose areas smaller.

California and Tennessee. On *Cariacus canadensis* (Briss.), *Bos taurus* L., and *Equus caballus* L.

Banks (1907, 608) lists *D. occidentalis* as a distinct species, but gives no anatomical details. Later, however (1908, 47-48), he gives the following specific description:

Male.—Red-brown, with many waxy-white markings, often with a waxy bloom, sometimes almost wholly white, but there is a red-brown near the eyes, on the festoons, and several submedian spots; moreover, the white is broken by the many red-brown punctures; legs pale reddish brown, marked with white above. Capitulum rather narrow, and the hind angles prolonged into very prominent spines; palpi very short, not as long as the width of the capitulum; dorsum not much more than one and one-half times as long as broad, with many punctures, but mostly small; lateral furrows distinct and long, twelve indented lines behind. Legs of moderate size, tarsus IV with two very distinct teeth below and one less prominent, teeth on other joints distinct; coxæ armed as usual; coxæ IV about one and one-half as wide at base as long. Stigmal plate elongate, with a broad, turned-up tip, almost truncate; large granulations on the main part, small ones on the tip.

Length of male, 3 to 3.5 mm.

Female.—Shield red-brown, mostly covered with white, red-brown near eyes and in the middle region, and the white broken up by the many brown dots at punctures; capitulum and legs red-brown, latter white at tips of joints, and generally paler above than below; abdomen dark red-brown. Capitulum rather small, and hind angles prominent, and the porose areas very small and rather close together. Shield about as broad as long, broadest before middle, and rather pointed behind, with many small punctures and some larger, but not nearly as many large ones as in *D. parumapertus*. Legs rather small, coxæ armed as usual. Stigmal plate with a broad dorsal prolongation, with large granulations in the main part, and minute ones on the prolongation.

Length of female shield, 1.5 mm.

Nearly all specimens come from California—Occidental, San Diego, Goose Lake, Siskiyou County, Santa Clara County, Humboldt County; some taken from deer.

Closely related to *D. venustus*, but with a more narrow capitulum, and with a broader prolongation to stigmal plate, in the male by shorter hind coxæ and in the female by smaller porose areas. Taken together, I think these characters indicate its distinctness from *D. venustus*.

In Marx's material I find one bottle (Marx 119) of specimens labeled *D. occidentalis*, from Occidental, California; this I assume is the material upon which he based the name, hence this would be the type material.

A microscopic examination of the stigmal plate shows that this tick is different not only from *D. reticulatus* of Europe but also from the American *D. reticulatus* of Salmon and Stiles (= *D. salmoni*).

Fig. 7 shows the male plate, with a pronounced dorso-lateral prolongation. The length of the plate, through the aperture, is 384 μ ; the breadth, including the prolongation, 320 μ . The goblets are 67 in number, of medium size, attaining about 32 μ in diameter, rather closely packed together so that they have a tendency to lose their circular form for an angular outline. The aperture of the plate is relatively small when compared with *D. andersoni*.

The following material, which has been taken as basis for the specific diagnosis given in the foregoing, has been examined:

- Marx 115. Host ?; Kern County, Cal., determined by Marx as *D. occidentalis*; determined by Neumann as *D. reticulatus occidentalis*.
 Marx 116. Host deer; ditto; ditto.
 Marx 117. Host ?; Santa Rosa, Cal.; ditto; ditto.
 Marx 118. Host ?; California; ditto; ditto.
 Marx 119. Host ?; Occidental, Cal.; ditto; ditto.
 B. A. I. 2155. Host California deer; collected by Cooper Curtice; determined by Marx as *D. occidentalis*.
 B. A. I. 3209. Host *Bos taurus*; Grand Island, Nebr.; collected by Hake & Co.; determined by Stiles in 1901 as *D. electus*. A male *D. occidentalis* mounted on slide with a female of another species.
 B. A. I. 3512. Host *Bos taurus*; San Luis Obispo, Cal.; collected by G. F. Foulkner, June 2, 1903; determined by Ransom as *D. reticulatus*; redetermined by Stiles as *D. occidentalis*.
 B. A. I. 3590. Host *Bos taurus*; San Luis Obispo, Cal.; collected by J. S. Jackson, February, 1904; determined by Ransom as *D. reticulatus*; redetermined by Stiles, 1909, as *D. occidentalis*.
 U. S. P. II. & M. II. S. 9769. Host and locality unknown. Specimen came from the U. S. N. M. and bore the number 1348. To judge from the trochanter, this is *D. occidentalis*, but the capitulum and shape of the stigmal plate give rise to some doubt on this point.

For some months I considered this form identical with *D. andersoni*, and it is due to this fact that *D. occidentalis* has been quoted in medical literature as the species involved in transmitting Rocky Mountain spotted fever. As is shown in the present paper, however, the two forms are specifically distinct.

DERMACENTOR ANDERSONI Stiles, (1905) 1908.

(Figs. 9-13, 44-48, 55, 56, 74, 88, 89, 107, 108, 126, 127.

- 1905: *Dermacentor andersoni* Stiles, 1905g, 22, 24 (Bitter Root Valley, Montana); 1908m, 949.
 1905: *Dermacentor occidentalis* of all writings on "Rocky Mountain Spotted Fever" as Ashburn, Craig, and Ricketts.
 1908: *Dermacentor venustus* Marx [in part only], of Banks, 1908, 46-47.

SPECIFIC DIAGNOSIS.—*Dermacentor* (p. 18): ♂, young and replete ♀: Caudal margin nearly or quite semicircular. Color grayish to red to deep reddish

brown, or even nearly black (♀), except scutum; capitulum and legs lighter. Dorsum: Eyes not very prominent. Scutum well provided with whitish to greenish white rust, which varies considerably in different specimens; punctations large and small. Venter: Genital pore surrounded by numerous hairs. Anal ring nearly or quite circular, 0.27 to 0.35 mm. in diameter. Stigmal plates with prominent dorso-lateral prolongation, which shows a tendency to form at the caudal margin of the plate a right angle in the male and an acute angle in the female; aperture (pore, macula) and chamber large, elongate; goblets of medium size, usually from 17.5 to 32 μ in diameter, but may vary between 5 and 40 μ in diameter, are closely set and occupy nearly entire surface of plate except margin and terminal portion of elongation; meshes of middle layer about 9 μ in diameter; stem of goblets about 4.5 μ in diameter. Capitulum: Postero-lateral projections of base short. External article with a proximal, very large recurved tooth, a subapical smaller tooth, and a very small apical tooth. Hypostome, each half with a number of small subterminal denticles, followed by three rows of strong denticles, followed proximally by smaller denticles. Palpi, lateral margin convex, article 1 provided with four to five strong bristles on ventro-median margin; article 3 rather triangular dorsally, bluntly rounded distally, with several bristles on the concave margin of dorso-terminal portion and one or two terminal bristles; dorso-retrograde prolongation of article 2 (so prominent in *D. reticulatus*) nil, but one may be indicated on the postero-median angle. Legs: Lateral (outer) spur of coxæ I longer than the median (inner) spur; trochanter I provided with retrograde curved blade; terminal recurved spur not very well developed on tarsi I.

Male.—Length, 4 mm. (exclusive of hind legs; with legs outstretched, about 5 mm.); greatest breadth, 2.5 mm. Body oval, sides may be somewhat straighter than those of *D. salmoni*, more like those of *D. variegatus*; unmounted specimens 0.88 mm. broad at scapulæ (shoulders), specimens mounted under pressure measure up to 1.12 mm. at this point; the sides diverge from here till they reach their maximum divergence at coxæ IV, where the breadth may vary from 2.25 to 2.5 mm. In unmounted specimens to 2.9 or even 3.25 mm. in specimens mounted under pressure. Dorsum: Scutum covers entire dorsum (except capitulum); scapulæ project 0.27 to 0.30 mm. from border of excavation; cervical and marginal grooves distinct, cervical groove deeper anteriorly than posteriorly; scutum deep reddish brown, nearly covered with rust; pseudoscutum rather prominent, extending about 0.37 of length of scutum in median line; the most prominent red spots (namely, not covered with rust) back of pseudoscutum are: (a) Four elongate spots arranged in a semicircle and running radially, or nearly so, from caudal margin of the pseudoscutum; (b) two elongate to reniform spots back of these, one on each side of scutum; (c) an elongated median spot and two shorter, elongate, submedian spots corresponding to the same spots in *D. variegatus*; (d) but the forked spot usually so prominent in *D. salmoni* and *D. variegatus* is usually either exceedingly indistinct or absent; only a portion of the lateral margin of the scutum is white, and usually three or four small dark spots may be seen on each side; the rust on the eleven distinct postero-marginal festoons is quite variable, in some specimens rather profuse, in others very slight; numerous punctations of 8 to 32 μ in diameter, and a number of 64 μ or more in diameter, of less regular outline; very short, microscopic, whitish hairs issue from the center of at least some of the larger punctations. Foveolæ a short distance caudad of pseudoscutum, near antero-median corner of coxæ IV, and measuring about 80 μ in diameter. Venter: Surface sparsely beset with hairs, which, with the circular pores through which they pass, are noticeably more numerous around the genital pore. Genital pore between coxæ II. Stigmal plates 0.416 to 0.640 mm. long (through the aper-

ture); breadth of plate (including prolongation), 0.480 to 0.656 mm.; goblets may attain 157 in number and 5 to 40 μ in diameter. Capitulum: 0.70 to 0.80 mm. long; base 0.528 to 0.72 mm. in breadth, and 0.288 to 0.352 mm. from posterior margin to anterior margin of portion over palpi; postero-lateral prolongations short, about 48 to 64 μ in length, rather blunt. Mandibles (chelicerae) 0.928 to 1.072 mm. long; digit 96 to 104 μ long; dorsal process of internal article elongate transversely and forming two transverse ridge-like edges directed toward the body, to some extent resembling the visors of two caps. Hypostome with seven to nine large denticles in each row. Palpi 480 to 640 μ long, each palpus 272 to 320 μ in maximum breadth; article 2 with six to seven bristles on ventro-median edge; article 3 with two to three bristles on ventro-median edge. Legs: Coxæ I to IV with curved mesial margin; coxæ IV present two types which grade into each other, and the two may even be found in one specimen; they may be relatively short or exceedingly long; ventral margins of legs bear spurs, especially femur and tibia IV; tarsi II to IV with large subterminal recurved spur.

Female.—Dorsum: Scutum 1.56 to 1.62 mm. long in median line; 1.4 to 1.9 mm. broad at lateral angles; very prominent because of its whitish color; scapulae project 0.256 to 0.352 mm. from border of excavation; from shoulders, the sides of scutum diverge in a rather irregular line to the lateral angles, then converge in nearly straight lines to the postero-lateral angles, when they suddenly change direction, converging much more rapidly, and forming a bluntly rounded posterior angle. Cervical grooves rather well developed, each forming an obtuse angle, at its equator, toward the median line, thus forming an hourglass like outline, deeper anteriorly than posteriorly; the distal, diverging portion of the hourglass is paralleled each side by a more or less well developed dark line; eyes at lateral angles; large punctations somewhat more prominent antero-laterally; rust not so thick in antero-median field. Uncovered portion of margins as elsewhere, and absent from lateral angles. Uncovered portion of dorsum shows coarser and finer, also irregularly shaped punctations, a distinct median and two submedian grooves, and distinct marginal groove limiting the eleven postero-marginal festoons. Foveolæ 0.096 to 0.112 mm. in diameter, a short distance caudad of scutum. Venter: Punctations and fine hairs present; genital grooves run subparallel caudad, diverging slightly to a point about halfway between coxæ IV and anus, whence they diverge markedly toward lateral margin; median post-anal groove distinct in unmounted specimens. Stigmal plate 0.5 to 0.528 mm. long (through aperture); breadth (including prolongation) about the same; goblets may attain 120 in number and 12 to 32, occasionally 40 μ in diameter. Capitulum: 0.672 to 0.848 mm. long; base 0.60 to 0.736 mm. broad, 0.24 to 0.288 mm. long from posterior margin to anterior margin of portion over the palpi; postero-lateral prolongation 16 to 32 μ , bluntly rounded; porose areas nearly meet in median line. Mandibles 0.96 to 1.118 mm. long; digit 96 to 128 μ long; dorsal process of internal article elongated somewhat transversely, with two pointed teeth. Smaller anterior denticles of hypostome confined to smaller area than in male; seven to nine or ten large denticles in each row. Palpi 0.544 to 0.672 mm. long by 0.256 to 0.32 mm. broad; article 2 with four to six strong bristles and article 3 with one to three bristles on ventro-median edge. Legs: Coxæ diverge II to IV; lateral (outer) spur of coxæ I may attain 320 μ in length; ventral margins of legs, especially femur and tibia IV, bear spurs or knobs or both; tarsi II to IV with two ventral chitinous knobs, showing some variation in different individuals.

Young female.—This seems to be the form most commonly found. Length 4.5 to 5 mm. (exclusive of hind legs; with hind legs extended may attain 6.5 to 7 mm.); greatest breadth 2.3 to 2.6 mm. Body oval, rather similar to male,

but not quite so flat; unmounted specimens 0.712 to 1.0 mm. broad at scapulæ, specimens mounted under pressure may attain 0.875 to 1.062 mm. at this point; the sides diverge from here to a maximum breadth (2.312 to 2.6 mm. in unmounted and 2.31 to 3.18 mm. in specimens mounted under pressure) about at stigmal plate. Dorsum: Scutum covers about 0.43 of length of body (exclusive of head); eyes not very distinct in unmounted specimens, more distinct as translucent spot with radial structure in mounted, cleared specimens. Venter: Vulva between coxæ II.

Replete female.—May attain 16 mm. long by 9.5 mm. broad by 6 mm. thick. Form varies with degree of repletion; legs I are lateral of scutum so that anterior margin may reach 2.37 mm. in breadth; from here body increases rapidly in breadth, reaching a maximum in region of coxæ III to IV; a slight constriction is common near stigmal plates, from which point the breadth rapidly decreases. Dorsum: Eyes somewhat more distinct than in young female, owing to their more prominent position due to change in form of body. Venter: Vulva may shift to intercoxal space of legs I to II; a radial submedian groove may appear each side between anal and genital groove; otherwise similar to young female except for proportions due to greater repletion. Legs: Coxæ much farther apart than in young female, due to repletion.

Hexapod larva.—On several occasions replete female specimens were allowed to oviposit, and the eggs were allowed to hatch. Length of larva may attain 0.656 mm.; greatest breadth 0.316 mm.; the caudal portion of the body is broader than the anterior. Scutum 0.224 mm. long, scarcely emarginate anteriorly; a small light, but slightly indistinct, spot (apparently the eye) is visible at the lateral angle, and back of this the scutum rounds off very abruptly; accordingly, the scutum is entirely different from that of the adults. Cuticle of the body, except where covered by heavier chitinous structures, is provided with wrinkles, like striations, of slightly irregular course, but for the greater part running transversely. Posterior margin with nine distinct, and two less distinct festoons, each of which, except the median, bears both dorsally and ventrally, a small hair directed postero-medial. Hairs are present also on other portions of the body and are arranged more or less symmetrically. Capitulum is decidedly *Rhipicephalus*-like in appearance, 176 μ broad, and its base is drawn out each side into a sharp lateral angle; postero-lateral prolongations (compare adults) are lacking, the proximal margin being straight and even. Mandibles 176 to 200 μ long; digit 22 μ ; external article with two distinct teeth, the anterior smaller, and the posterior larger; dorsal process of internal article difficult to analyze, apparently elongated transversely, and possessing two (or three??) teeth. Hypostome spatulate, each half with two longitudinal rows of distinct denticles, five to six in each row; proximally of these, there are several indistinct denticles. Palpi may or may not extend beyond hypostome; when straightened under pressure, however, they are slightly longer than hypostome; maximum breadth 44 μ ; article one very small, scarcely visible; article two measures about 44 to 66 μ long, and bears several stout serrate bristles; one bristle is situated near distal end on ventro-median edge; one near proximal end on lateral border; one on dorso-median border near the middle of the article; and one dorsally near proximal end; article three measures 44 to 52 μ long, and bears several bristles, the most prominent of which are: one proximal, ventrally; one lateral, and two near the distal end; article four extends directly ventrad in a subterminal depression of article three, and bears about seven or more longer and shorter terminal bristles. Coxæ increase in size and are slightly divergent from I to III; coxæ I have a strong ventral spur directed caudad, and three prominent bristles, one of which is anterior and terminal, one on the median border, and one ventral near lateral border; the

ventral spur of coxæ II to III is smaller than that of coxæ I; anterior and posterior lateral bristles on coxæ II and III corresponding to those of coxæ I, but the median bristle appears to be wanting; ventrally, on the body, there is a pair of bristles between the postero-median corners of coxæ I, II, and III. Four pairs of small stigmata are present, one stigmal opening being situated latero-caudad of each of coxæ I, one caudad of each of coxæ II and III, and one pair on transverse anal zone. The articles of the legs are well provided with bristles, rather symmetrically arranged, but no spurs are present. Pulvillum extends to about the middle of the claws. Anal ring $44\ \mu$ in diameter, and enclosing two lateral labia, each with a post-equatorial bristle.

Type.—U. S. P. H. & M. H. S. 9467.

Hosts.—Man (*Homo sapiens*), cattle (*Bos taurus*), horses (*Equus caballus*) dogs (*Canis familiaris*), rabbit (*Lepus* sp.), and apparently the ground squirrel or gopher (*Citellus columbianus*), and an undetermined species of squirrel.

GEOGRAPHICAL DISTRIBUTION.—Montana, Washington State, Colorado, and (?) Idaho.

This species has passed through a varied and confusing history. Its variation is such that I have changed my opinion upon it at least a dozen times; in 1905 I determined it is as a new species, *D. andersoni*, but later in correspondence with various writers I suppressed the species in favor of *D. occidentalis*, thus adopting a determination made by Curtice some years ago. Marx confused the species with *D. americanus* (= *electus*). Very recently Banks (1908, 47) has identified it with *D. venustus* of Texas.

I have now been able to examine a large series of specimens and am persuaded that the recognition of a new species was justified. After finding certain characters, it now seems strange how it was possible to confuse it with other forms, yet in this confusion *D. andersoni* has simply repeated the history of many other species.

D. andersoni as described here is the common tick of the Bitter Root Valley, Montana, and is the form which has been collected by authors who have worked on Rocky Mountain Spotted Fever in that region. In all literature on that disease, this is apparently the tick^a referred to under the name *Dermacentor occidentalis*.

In connection with the foregoing discussion I have compared the following specimens in the collection of the U. S. P. H. & M. H. S.:

9465. Host *Lepus* sp., at Polaris, Mont.; collected by Dr. F. M. Poindexter in 1904.

9466. From Victor, Mont.; collected by Dr. J. J. Buckley, May 28, 1904.

9467. Host *Equus caballus*, at Woodman, Mont.; collected by Mr. John Mills, May, 1904.

9468. From Polaris, Mont.; collected by Dr. F. M. Poindexter, 1904.

9470. From Missoula, Mont.; collected by Prof. M. J. Elrod, May 4, 1904.

9471. Host *Homo*, at Missoula, Mont.; May 10, 1904.

9472. From River View, Fork Valley, Mont.; collected by E. S. Hall.

^a I assume full responsibility for the erroneous use of the name *D. occidentalis* in medical literature, but have no apologies to make for the confusion, for it was made at a time when the two species could not be distinguished satisfactorily.

9473. Host *Homo*, in Montana; collected by Doctor Gates, April 30, 1904.
 9474. From Woodman and Lo Lo, Mont.; collected by Mr. McGrath.
 9475. Near Lo Lo, Mont.; collected by Mr. John Mills.
 9476. Host *Homo*, at Missoula; collected by Dr. J. J. Buckley, May 12, 1904.
 9477. From River View, Fork Valley, Mont.; collected by E. S. Hall, May, 1904.
 9478. Host *Homo*, in foot hills south of Hamilton, Mont.; May, 1904.
 9479. Host *Homo*, at Nimrod, Mont.; collected by Doctor Spottswood, May 16, 1904.
 9480. Host ?, at Red Lodge, Mont.; collected by Mrs. J. Flaherty, May, 1904.
 9481. From Foy's Lake, near Kallispell, Mont.; May, 1904.
 9482. Host *Homo*, near Hamilton, Mont.; collected by Doctor McGrath, April and May, 1904.
 9483. From Grantsdale, Mont.; collected by A. L. Holt, May, 1904.
 9484. From Missoula, Mont.; collected by Mrs. C. W. Stiles.
 9485. Host *Homo*, at Missoula, Mont.; collected by Doctor Spottswood, May 9, 1904.
 9486. Host *Homo*, at Missoula, Mont.; collected by Doctor Spottswood, April 22, 1904.
 9487. Host *Bos taurus*, near Hamilton, Mont.; collected by Doctor Tuttle, May 22, 1904.
 9488. Host *Homo*, at Lo Lo, Mont.; collected by Doctor Gwinn.
 9489. From Trall Creek, Mont.; May 23, 1904.
 9490. Host *Homo*, at Missoula, Mont.; collected by Doctor Pixley, May, 1904.
 9491. From Polaris, Mont.; collected by Miss Emma Saltine, May, 1904.
 9492. Host *Homo*, at Missoula, Mont.; collected by Stiles, May 10-15, 1904.
 9493. Host *Homo*, at Missoula, Mont.; collected by Dr. J. J. Buckley, May, 1904.
 9494. Ditto.
 9495. From Fort Logan, Mont.; collected by Max Sarter.
 9496. Host *Equus caballus*, near Jefferson, Mont.; May, 1904.
 9497. From Missoula, Mont.; collected by Prof. M. J. Elrod.
 9499. Host *Bos taurus* at Alhambra, Mont.; collected by Mrs. H. F. Staph, May, 1904.
 9500. Host *Homo*, near Helena, Mont.; collected by Dr. T. D. Tuttle, May 22, 1904.
 9501. From Watson, Mont.; May, 1904.
 9502. Host *Equus caballus*, at Livingston, Mont.; collected by Doctor Tuttle, May, 1904.
 9503. From Lo Lo, Mont.; collected by John Mills.
 9504. Bitter Root Valley, Mont.; collected by Doctor Spottswood.
 9505. Host *Bos taurus*, at Livingston, Mont., May, 1904.
 9506. From Grantsdale, Mont.; collected by A. L. Holt, May, 1904.
 9507. Host *Equus caballus*, at Grants Creek, near Missoula, Mont.; collected by Dr. J. J. Buckley, May 9, 1904.
 9508. Host *Equus caballus*, at Nelson Gulch, near Helena, Mont.; collected by Dr. T. D. Tuttle, May, 1904.
 9509. Host *Homo*, at Grantsdale, Mont.; collected by A. L. Holt.
 9510. Host *Equus caballus*, near Helena, Mont.; collected by Dr. T. D. Tuttle.
 9511. Host *Homo*, at Helena, Mont.; collected by Dr. T. D. Tuttle, May, 1904.
 9512. Host *Equus caballus*, near Florence, Mont.; collected by Ashburn and Stiles, May 19, 1904.
 9513. From Dillon, Mont.; collected by Mr. Riley.
 9517. From Fort Missoula, Mont.; collected by Ashburn and Stiles, May, 1904.
 9518. Host *Bos taurus*, at Livingston, Mont.; collected by Dr. T. D. Tuttle, May, 1904.

9551. Hexapod larva, host *Citellus columbianus*. This is apparently the hexapod larva of *D. andersoni*.
9557. Ditto.
9589. From Montana, June, 1904.
9742. From Montana. In collection of Army Medical Museum.
9755. Belongs to U. S. National Museum, with two labels "24" and "25;" locality and host not given; belongs to *andersoni* group, perhaps to *D. andersoni*.
9760. Collected at Elko, Nev., by Mr. Whickham; belongs to *andersoni* group, possibly to *andersoni*.
9761. Collected by E. A. Bush, San Jose, Cal., August 2, 1887. Apparently *D. andersoni*, but not exactly typical specimen.
9768. From Utah. Material poor; belongs to *andersoni* group; if a *D. andersoni* it is not very typical.
9782. From U. S. National Museum, with label "*Dermacentor occidentalis* n. sp. Curtice, Easton, Wash. K." This is not *D. occidentalis*, but is closely related to, possibly identical with, *D. andersoni*.
10429. From Utah, collected by Alf. A. Robinson, 1908. Possibly represents a distinct species; it belongs to the *andersoni* group, but appears not to be a typical *D. andersoni*.
10018. Host *Equus caballus*, at Missoula; collected by Doctor King.
- Marx 135. Host?; Glenwood Springs, Colo.; determined by Marx as *Dermacentor americanus* (= *electus*); determined by Neumann as *D. electus*. Shows exceedingly slight differences from the Montana forms of *andersoni*, but I do not feel justified on present material in describing it as distinct, although it is not impossible that examination of extensive material might reveal distinct differences.
- B. A. I. 3400: Host *Homo*, Wyoming; determined by Stiles in 1902 as *D. reticulatus*.
- B. A. I. 2424: Host *Bos taurus*; Eagleville, Cal.; collected by C. H. Blemer, 1896; determined by Stiles and Hassall as *D. americanus*; redetermined by Stiles, 1909, as *D. andersoni*.

The stigmal plates of this species, as found in the Bitter Root Valley, Montana, present the following characters:

The male plate (fig. 9) is similar to the female plate in general structure, but in the male the prolongation is at right angles to a plane drawn through the aperture, while in the female the prolongation forms an acute angle with that plane; 157 goblets are present.

Figure 10 shows the female plate of P. H. & M. H. S. 9503, taken at Lo Lo, Bitter Root Valley, not far from the point where the type (9467) was collected. The plate has a pronounced dorso-lateral sub-terminal prolongation. The aperture is relatively long. The plate measures 544 μ long, through the aperture, by 528 μ broad, including the prolongation. The goblets, 120 in number, occupy nearly the entire surface of the plate, except at the margins and near the end of the prolongation. On a very superficial focus these goblets come close together, and as a result they have a tendency to change their more or less circular outline for an angular outline; upon lowering the focus very slightly the appearance given in figure 9 is obtained.

The goblets are of medium size, may attain 32 or even 36 μ in diameter; the stems in the inner layer are seen more distinctly near the periphery than near the aperture.

DERMACENTOR VENUSTUS Marx, 1897.

(Figs. 14, 15, 57, 75, 90, 109.)

1897: *Dermacentor venustus* Marx in Neumann, 1897a, 365 (from Texas and New Mexico, not described) as syn. of *D. reticulatus* (Fabr.); 1901a, 345 (as a syn. of *D. reticulatus*).—Banks, 1908, 46–47 (in part only).—Salmon and Stiles, 1901a, 449 (as syn. of *D. reticulatus*).—Stiles, 1908m, 949.

SPECIFIC DIAGNOSIS.—*Dermacentor* (p. 18): ♂ and young ♀: Caudal margin about semicircular, anus nearer caudal than lateral margins. Color (alcohol specimens) dark reddish brown, except for rust on scutum; capitulum and legs lighter. Dorsum: Eyes not prominent. Scutum with a fair amount of whitish rust; punctations large and small. Venter: Genital pore of male surrounded by a number of punctations. Anal ring circular, prominent, 0.3 mm. in diameter. Stigmal plates with prominent dorso-lateral prolongation, the caudal margin of which forms with the plane of the aperture, a broadly rounded obtuse angle in the male and a right (?) angle in the female; aperture and chamber prominent; goblets medium size, attain about 10 to 43 μ , usually 24 to 40 μ in diameter, not thickly set in male, concentrated around aperture, more separated on prolongation (♂), attain 75 (♂) in number; meshes of middle layer 8 to 12 μ . Capitulum: Postero-lateral projections of base 64 μ long. External article (♂) with two teeth, one not very large proximal and one very small apical. Hypostome, each half with a number of minute subterminal denticles, followed by three rows of large denticles, followed by a number of scale-like denticles. Palpi, dorso-median margins convex; article 3 not distinctly triangular dorsally, appears somewhat quadrangular; a few subterminal bristles on median concave margin of dorsal portion of article 3. Legs: Lateral (outer) spur of coxæ I very slightly longer than the median spur; trochanter I —; spurs or knobs on ventral margin of legs may be very prominent; tarsi I —, tarsi II–IV —; pulvillum —.

Male.—Length 4.9 to 6.0 mm. long (exclusive of hind legs; with legs extended may attain 6.5 to 7.3 mm.); greatest breadth 2.93 to 3.75 mm. Body elongate oval; unmounted specimens attain 1.0 mm. broad at scapulæ, a specimen mounted under pressure measures 0.96 mm. at this point; the sides diverge from there in a slightly curved line to the broadest portion at coxæ IV, the curve being slightly interrupted at the eyes; the sides then converge rapidly. Dorsum: Scutum covers entire dorsum (except capitulum) or a slight marginal border may be uncovered; scapulæ project 0.24 to 0.48 mm. from rounded anterior border of excavation; cervical grooves very short, not very deep, only the usual cephalic portion being evident; marginal groove may be well marked; scutum reddish brown, with comparatively small, but fair, amount of whitish rust, and on account of small amount, the usual reddish spots are indistinct; pseudoscutum may be fairly well marked, though it is not prominent, extending about 0.40 of length of scutum in median line; small and large punctations present, the larger especially prominent. Foveolæ 80 μ in diameter, over coxæ IV. Venter: Surface with not unusually numerous hairs and punctations, but especially numerous near genital pore. Genital pore between coxæ II; genital groove present. Stigmal plate 0.48 mm. long (through aperture); breadth (including prolonga-

tion) 0.56 mm.; goblets may attain 75 in number and 12 to 43 μ in diameter. Capitulum: 0.896 mm. long; base 0.56 mm. broad, 0.32 mm. from posterior margin to anterior margin over palpi; postero-lateral prolongations 64 μ , blunt. Mandibles 0.88 mm. long; digit 128 μ long; dorsal process of internal article elongate transversely, with two visor-like ridges. Hypostome with seven to eight large denticles in each row. Palpi 480 μ long, each palpus 272 μ in maximum breadth; article 1 with five ventro-median bristles; article 2 with five such bristles; article 3 with (?) two such bristles. Legs: Coxæ I to IV with rather rounded mesial margin; coxæ IV quite large; ventral margins, especially of femur, tibia, and protarsus IV, with well developed spurs; at least tibia IV (others could not be studied) with large subterminal recurved spur.

Female.^a—Dorsum: Scutum 1.52 mm. long in median line; 1.79 mm. broad at lateral angles; rather prominent because of its whitish rust; scapulæ project (?)—; from shoulders the sides diverge in a convex line to lateral angles, then they converge in nearly a straight line to postero-lateral angles, when they converge more rapidly to form a bluntly rounded caudal angle. Cervical grooves very prominent, hour-glass shaped, deeper cephalad than caudad; eyes rather prominent, at lateral angles; large and small punctations present, the larger especially prominent in lateral fields; rust not so thick in antero-median field as elsewhere. Uncovered portion of dorsum with not very prominent hairs and punctations, a median and two submedian grooves present, marginal groove and postero-lateral festoons not very prominent. Foveolæ a short distance caudad of scutum, about 64 μ in diameter. Venter: Punctations and hairs not prominent; genital grooves diverge gradually to a point about halfway between coxæ IV and anus, then they diverge markedly toward lateral margin; median postanal groove distinct. Stigmal plate with prominent dorso-lateral prolongation which is at nearly right angle to a line drawn through the rather elongate aperture; about 105 goblets are present, attaining 10 to 30, even 43 μ in diameter. Capitulum: Something over 0.576 mm. long; base 0.672 mm. broad; porose areas rather deep, do not meet in median line, diverge anteriorly. Mandibles (?); digit (?); dorsal process of internal article (?). Smaller denticles on hypostome rather numerous; eight or nine large teeth in each row. Palpi (?); article 1 apparently with four, article 2 with five, article 3 with three ventro-median bristles. Legs: Coxæ diverge I to IV; spurs or knobs (?).

Young female.—Length 5.3 mm. (exclusive of hind legs); greatest breadth 3.3 mm. Body rather oval; unmounted specimen measures 1.0 mm. broad at scapulæ; the sides diverge from here in a convex line (slightly interrupted between legs I and II) to a maximum breadth at the stigmal plates. Dorsum: Scutum covers about 0.32 of the length of the body (exclusive of capitulum); eyes rather large and distinct. Venter: Vulva between coxæ II.

TYPE.—Marx 122, in U. S. National Museum.

HOST.—Sheep (*Ovis arles*) in Texas.

In the Marx collection I find three bottles containing ticks which Marx determined as *Dermacentor venustus*, namely:

Marx 120. Host (?)—; Las Cruces, N. Mex., one male; determined by Marx as *D. venustus*; determined by Neumann as *D. reticulatus occidentalis*. This is a member of the *andersoni* group, but it is not *D. occidentalis*. It may be *venustus*, but as there is only one specimen, which can not be mounted, I reserve judgment.

^a Only one specimen, which could not be mounted.

Marx 121. Host Mountain goat; Soldier, Idaho; one male determined by Marx as *D. venustus*; determined by Neumann as *D. reticulatus occidentalis*. Not being able to mount this, as it is a single specimen, I hesitate to make a definite determination; but it is not *D. occidentalis*; it bears a striking resemblance to *D. andersoni*, so far as can be seen on unmounted material.

Marx 122. Host *Ovis arics*; Texas; three males, one young female; determined by Marx as *D. venustus*; determined by Neumann as *D. reticulatus occidentalis*. This lot, I assume, is type of *D. venustus*.

Microscopic examination of the stigmal plates shows that they are quite distinct from *D. reticulatus*, but very closely related to *D. parum-apertus* and *D. occidentalis*.

Figure 14 shows the plate of the male, which is seen to have a pronounced dorsal prolongation. The aperture is broad, but not very long, and lies slightly antero-mediad of the center of the body of the plate. The goblets are of medium size, circular to elongate, and attaining a diameter of 48 by 28 μ . They may attain 75 in number and are somewhat scattered; the goblets near the aperture are larger, those nearer the periphery are smaller and more scattered, those in the prolongation are smallest and the most scattered. The longitudinal diameter of the plate is 480 μ , the transverse diameter (including prolongation) is 544 μ .

The specific description of *D. venustus* as given by Banks is influenced by the fact that he includes *D. andersoni* in this species.

Mr. Banks (1908) has examined the types and drawings of *D. andersoni*, my drawings of Marx's *D. venustus*, and also Marx's original material, and apparently Marx's manuscript of *D. venustus*. He considered *venustus* and *andersoni* specifically identical and has published them as such under the name *D. venustus*, although he does not refer to the name *D. andersoni*. He says:

Specimens come from various places in the West; Olympia, Yakima, Klikitat Valley, and Grand Coulee, Wash.; Fort Collins and Boulder, Colo.; Pecos and Las Cruces, N. Mex.; Bozeman, Mont.; Bridger Basin, Utah; Soldier, Idaho; and Texas (on sheep).

This species is quite common in the Northwest. It has been included in *D. occidentalis* by Neumann, but was separated out by Doctor Marx in manuscript under the name I have adopted. It is larger than *D. occidentalis*, with more red and less white in the coloring, and differs in many minor points of structure, as size of porose areas, size of hind coxae in male, etc. This is the species supposed to be concerned in the transmission of spotted fever in Montana.

Bank's description of *D. venustus* is based largely, and his drawings exclusively, on material which is in reality *D. andersoni*. This combination of circumstances gives rise to some complication. My interpretation of the best way to solve the difficulties is this: Marx's material and Marx's name are, as admitted by Banks, a part of *D. venustus* as described under Marx's manuscript name *D. venustus*, which is adopted by Banks, although Banks writes "n. sp." after this name. I can not assume that the type specimens of this *D. venustus*

can be other than the Marx material, for any such assumption would necessarily carry with it a corollary that Banks had examined the unpublished manuscript and drawings of two personal friends (one deceased) and had taken advantage of these circumstances. It will be noticed that he did not mention the museum number of the type specimen of *D. venustus* as construed by him, and the most natural assumption is that it is to be found in Marx's material. Further, this interpretation preserves two specific names now published for their respective species.

If it were to be construed that the type of the species *D. venustus* as interpreted by Banks were not in Marx's material, then the type of *D. andersoni* examined by Banks would come up for consideration. To interpret this as type would produce confusion, and seems not only unnecessary but perhaps unwarranted. The only remaining possibility would be that the type of *D. venustus* is to be found in Banks's specimens (other than what he examined in my laboratory), but it is found impossible to follow this side of the question further, as it would be a reflection upon my friend Banks and would not simplify matters. If any person should be inclined to differ with me in this interpretation, it may be recalled that it is clear that the material of Banks's *D. venustus* would under any other interpretation include three distinct sets of type material, and it is equally clear that Marx's type material is the oldest.

The entire question at issue contains elements which are not covered in detail by the International Code.

DERMACENTOR PARUMAPERTUS Neumann, 1901.

(Fig. 16.)

1901: *Dermacentor parumapertus* Neumann, 1901a, 267-268 (host unknown, at Lakeside, Cal.).—Banks, 1907, 608; 1908, 45-46, pl. 8, figs. 8, 10.

1905: *Dermacentor electus parumapertus* (Neumann, 1901) Neumann, 1905d, 236.

The specific diagnosis as given by Neumann is as follows:

Male.—Unknown.

Female.—Body oval, swollen, slightly broader anteriorly, sides subrectilinear, 9 mm. long, 5.5 mm. broad. Color deep chestnut-brown. Shield oval, slightly longer (1.5 mm. long) than broad, contour slightly sinuous back of eyes; eyes flat, blackish, large, near equator of shield; cervical grooves very broad, being confounded with lateral grooves; punctations numerous, unequal, the larger occupying especially the grooves and forming two longitudinal series on the median field; color deep chestnut-brown. Dorsal and ventral surfaces smooth, with numerous fine punctations. Vulva very small, very anterior, in plane of second intercoxal space. Anus very small, toward posterior third; no anal groove.

Peritremes (stigmal plates) very small (340 μ), oval, with a short retro-dorsal prolongation. Rostrum small, 0.7 mm.; base short, at least twice as broad as long, rectangular, posterior angles slightly salient; porose areas small,

deep, oval, subparallel. Hypostome spatulate, slightly rounded at extremity, with three rows of seven to nine teeth each side. Palpi thin, sides parallel; article 2 one and one-half times as long as article 3. Legs medium. Coxæ I divided into two short spines, the median thicker; a small spine at postero-external angles of coxæ II-IV. Tarsi progressively attenuated, terminated by a short spine.

Banks (1908, 45-46) restudied this form, which he describes as follows:

DERMACENTOR PARUMAPERTUS Neumann.

Male.—Dark red-brown, legs a trifle paler, no white markings, except sometimes a few small spots, and a minute white spot at tips of some joints of the legs. Capitulum moderately broad, hind angles only very slightly produced; palpi very short, not as long as width of capitulum; dorsum one and two-thirds times as long as broad, with many scattered, deep, but not very large punctures, submarginal furrow very distinct on the sides, less so behind; twelve impressed lines near posterior margin. Coxæ spined as usual, hind coxæ barely wider on base than long, legs rather short, hind pair not so much larger than the others, and the teeth below small and indistinct. Stigmal plate elongate, attenuate behind, the fore part around peritreme with large granules, a few down on the narrow portion, which is covered with smaller granules.

Length of male, 2.8 mm.

Female.—Shield and capitulum dark red-brown or almost black, without marks; abdomen blackish; legs red-brown, a faint white mark at tips of some of the joints. Capitulum moderately broad, hind angles distinctly prolonged behind, porose areas rather small, nearly circular, and well separated; palpi as long as width of capitulum. Shield plainly a little longer than broad, with many deep punctures; those in the depressed area each side especially large and numerous, almost confluent. Legs rather small and short; coxæ armed as usual. Stigmal plate small, with a distinct, although short and broad, dorsal prolongation; most of the surface with rather large granules, but those on the prolongation very small.

Length of female shield, 1.1 mm.

Specimens are from Lakeside, Cal. (also Neumann's type in the Marx collection), taken on man, and in a chicken house.

Distinguished from other forms most readily by lack of white on shield, by porose areas, and stigmal plate. After describing this species, Neumann later made it a variety of *D. electus* (*variabilis*), but it differs in many important characters from that species, and the granulations of the stigmal plate are much larger.

DERMACENTOR PARUMAPERTUS var. MARGINATUS.

This form agrees in general with the true *D. parumapertus*, but differs in several minor points. The posterior border of the female shield is margined with white; the porose areas are larger and rather closer together; the lateral lobes of the shield have fewer punctures, and the shield is more contracted behind the eyes; the stigmal plate of the female has a narrower dorsal prolongation, and the inner margin is more convex; the posterior angles of the capitulum are less prominent. Otherwise it is very similar to the type.

Several specimens from Mesa City, Ariz., from a jack rabbit (Cordley).

My material, apparently the type specimen, does not permit a detailed study.

A microscopic examination of the stigmal plates of the type specimens (Marx 143) shows that this form is quite distinct from *D. electus* and that it is closely related to *D. venustus* and *D. andersoni*. The slide of the type is not especially good, but certain features can be clearly recognized.

Figure 16 represents the stigmal plate of the female. It will be noticed that the plate is relatively small, the aperture, and especially the chamber, relatively very large; a prominent dorso-lateral prolongation is present; and the goblets are rather numerous (90) and of medium size, 7 to 25 μ in diameter. One of the most prominent features is the convexity of the surface, especially near the aperture. This convexity gives to the plate an appearance which is quite different from that noticed in the other species, where it may be relatively flat, or even concave. Two other characters of the plate are quite prominent: The goblets are unusually circular in outline and arranged rather regularly near the aperture; further, on the proximal border of the dorso-lateral prolongation there is a prominent, solid, broad margin, free of goblets or other similar structures.

Very closely allied to *D. parumapertus* is the following form:

DERMACENTOR PARUMAPERTUS MARGINATUS Banks, 1908.

(Figs. 17-19, 58, 59, 76, 91, 92, 110, 111, 128.)

1908: *Dermacentor parumapertus marginatus* Banks, 1908, 46, pl. 8, fig. 6 (host, Jack rabbit [probably *Lepus eremicus*]; Mesa City, Ariz.).

Banks has recognized as a subspecies of *D. parumapertus* a form taken from the Jack rabbit in Arizona. Owing to paucity of material of the type form, I am not altogether clear at present as to the relations of the two ticks in question. The following description is based upon material which is evidently Banks' *D. p. marginatus*:

SUBSPECIFIC DIAGNOSIS.—*Dermacentor* (p. 18): ♂ and ♀: Caudal margin practically semicircular, but anus nearer caudal than lateral margins, except in replete female. Color reddish brown, very little rust present (alcohol specimens); capitulum about the same color, but legs lighter. Dorsum: Eyes not very prominent, but quite distinct in mounted specimens. Scutum with only a slight amount of rust; large punctations much more prominent than the smaller. Venter: Genital pore surrounded by numerous large and small punctations, especially in male. Anal ring circular, 224 to 230 μ in diameter. Stigmal plates with prominent, broad, dorso-lateral prolongation; goblets of medium size, 7 to 32 μ in diameter, attain 44 to 99 in number, unusually circular, concentrated around aperture, but scattered on prolongation which forms caudally an obtuse angle in the male and an acute angle in the female; meshes of middle layer vary in diameter. Capitulum: Postero-lateral prolongations of base short. Hypostome, each half with a number of minute terminal and subterminal denticles, followed by three rows of larger denticles, followed by scales. Palpi, lateral margins convex; median dorsal margin prominently convex. Legs: The lateral (outer) spur of coxæ I distinctly longer than the

median which is quite short; trochanter I with a dorso-terminal retrograde blade, similar to *D. andersoni*; ventral knobs not well developed; tarsi I with poorly developed terminal spur.

Male.—Length 2.8 to 3.187 mm. (exclusive of hind legs; with hind legs extended may attain 4.18 mm.); greatest breadth 1.68 to 1.81 mm. Body rather triangular; unmounted specimens attain 0.64 to 0.688 mm. broad at scapulæ; specimens mounted under pressure may attain 0.75 mm. at this point; the sides diverge from here in almost a straight line until they reach their maximum diameter. Dorsum: Scutum covers nearly or quite entire dorsum (except capitulum); scapulæ project 0.08 to 0.16 mm. from border of excavation, which is rather convex cephalad; cervical grooves deep and prominent anteriorly; marginal groove distinct; scutum dark reddish brown, very little rust present (alcohol specimens); pseudoscutum very indistinct; numerous fine punctations and hairs present; also large punctations, which are unusually prominent, and more apparent in marginal field than elsewhere; eyes well marked at coxæ II. Foveolæ just back of plane of anterior margin of coxæ IV, 64 μ in diameter. Venter: Ventral surface with coarse and fine punctations and large and small hairs, especially numerous near genital pore; four longitudinal rows of large hairs especially prominent arranged near median and lateral margins of coxæ. Genital pore between coxæ II; genital groove distinct. Stigmal plate rather small and rather similar to *D. occidentalis*; 0.256 to 0.288 mm. long (through relatively large aperture); 0.32 to 0.40 mm. broad (including long slender dorso-lateral prolongation); attaining 0.488 mm. when measured from antero-median margin to tip of prolongation; goblets may attain 44 in number, 13 to 32 μ in diameter, rather concentrated around aperture, fewer and more scattered on prolongation. Capitulum: 0.56 to 0.6 mm. long; base 0.432 to 0.512 mm. broad by 0.192 mm. from posterior margin to anterior margin over palpi; postero-lateral angles project 32 to 40 μ , rather blunt. Mandibles 0.7 to 0.8 mm. long; digit 88 μ long; external article with large proximal and smaller distal tooth, the usual minute apical tooth not visible (absent?); dorsal process of internal article not very prominent, elongate transversely in two visor-like ridges. Hypostome with minute subterminal denticles, followed by three rows of six to eight large denticles, followed by scale-like denticles disappearing median to lateral. Palpi 0.368 to 0.4 mm. long; each palpus about 144 to 200 μ in maximum breadth; article 1 small, with two bristles, article 2 with four bristles, article 3 with two bristles. Legs: Coxæ IV rather large, may attain plane of caudal margin of stigmal plates; ventral knobs not well developed; tarsi I with poorly developed terminal spur; tarsi II–IV with poorly developed sub-terminal and not very well developed terminal spur.

Female.—Dorsum: Scutum 1.23 to 1.37 mm. long in median line; 1.5 to 1.6 mm. broad at lateral angles; distinct despite small amount of rust present (alcohol specimens); scapulæ project 160 to 270 μ from anterior margin; from shoulders the sides of scutum diverge in a very convex line to lateral angles, from here they converge in a line (which may be slightly concave) to the blunt postero-lateral angles, then they converge more rapidly forming a bluntly rounded caudal margin; in general the outline appears oval. Cervical grooves very distinct, broad caudally, forming an hourglass. Eyes at lateral angles, not prominent under a hand lens, but may appear light, more prominent, and rather salient under the microscope. Some fine punctations present; larger punctations quite prominent. Rust appears on postero-lateral margins. Uncovered portion of dorsum with numerous not very prominent punctations and hairs; also a distinct median and two submedian grooves, marginal groove not very prominent. Venter: Fine and coarse punctations (cuticular rings with

hairs) present; one row of hairs especially prominent each side, lateral of lateral spine of coxæ; genital grooves diverge slightly to a point about half way between coxæ IV and anus, whence they diverge markedly toward lateral margin; median postanal groove present. Stigmal plates 0.384 to 0.4 mm. long (through unusually large aperture and chamber); 0.352 to 0.384 mm. broad, including prominent projection; goblets 73 to 99 in number, 7 to 30 μ in diameter. Capitulum: 0.83 to 0.94 mm. long; base 0.656 to 0.72 mm. broad, 0.24 to 0.27 mm. from posterior margin to anterior margin over palpi; postero-lateral angles short, 16 to 48 μ , bluntly rounded. Porose areas nearly circular to rather oval, do not meet in median line. Mandibles attain 1.12 mm. long; digit 128 μ long; external article with three teeth, proximal large, subapical smaller, apical very small; dorsal process of internal article apparently with two prongs. Hypostome with smaller terminal denticles, followed by three rows of large denticles, ten to twelve in each row, disappearing median to lateral. Each palpus attains 0.59 to 0.64 mm. long, by 0.256 mm. broad; article 1 triangular to nearly quadrangular ventrally, with four ventro-median bristles; article 2 much longer than broad, with five ventro-median bristles; article 3 nearly quadrangular dorsally, with two to three ventro-median bristles; article 4 small, ventro-subterminal of article 3 and with several bristles. Coxæ II to IV diverge; median spur on coxæ I unusually short when compared with lateral spur, which attains 160 μ in length and shows a tendency to curve laterad; tarsi I with very poorly developed terminal spur; spur on tarsi II to IV slender, not very prominent.

Young female.—Length 3.375 to 3.875 mm. long (exclusive of hind legs; with hind legs extended attains 5.0 to 5.3 mm.); greatest breadth 2.0 to 2.625 mm. Body elongate oval to broad oval; unmounted specimens 0.8 to 0.88 mm. broad at scapulae; the sides diverge from here in a markedly convex line (which is slightly interrupted between legs I and II) to their maximum, when they converge rapidly, forming a bluntly rounded caudal margin. Dorsum: Scutum covers 0.43 to 0.50 of length of body (exclusive of head); postero-marginal festoons evident but not unusually prominent. Foveole a short distance caudad of scutum, 64 to 112 μ in diameter. Venter: Vulva between coxæ II. Anus nearer caudal than lateral margins.

Replete female.—May attain 10.3 mm. long by 7 mm. broad by 5 mm. thick. Form oval. Legs I lateral of scutum so that anterior margin of body (back of head) seems almost straight and attains 1.84 mm. in breadth; from here body increases rapidly in breadth to its maximum in the region of coxæ IV; no constriction visible at stigmal plate; caudal end very bluntly rounded. Dorsum: Eyes slightly more distant than in young female, owing to their more prominent position, due to change in form of body. Scutum with rust at margins as in young female. Median and submedian grooves visible as lines, and a pair of broken grooves (indicated as lines) lateral of submedian grooves. Venter: Vulva has shifted to anterior of plane of coxæ II. Genital groove still distinct, postanal groove appears merely as a line. Legs: Coxæ much farther apart, due to repletion.

TYPE.—Collection, Banks, Washington, D. C.

Of this form I have seen the following specimens:

Marx 137. Host, Jack rabbit; Fort Bowie, Ariz.; determined by Neumann as *Dermacentor electus*.

Marx 139. Host, Jack rabbit; Fort Bowie, Ariz.; determined by Neumann as *Dermacentor electus*.

? Marx 142. Host and locality?; determined by Neumann as *Dermacentor electus*. This is a member of the *andersoni* group, and is probably the same as 137, but the material is not very favorable for identification.

- B. A. I. 3415. Host, *Lepus campestris*; Deming, N. Mex.; collected by A. H. Wallace; determined by Stiles in 1902 as *D. reticulatus*.
- Marx 129. Host (?), Elko, Mont.; determined by Marx as *D. americanus*; determined by Neumann as *D. electus*; two gravid females, not especially favorable for determination; clearly belonging to *andersoni* group, and apparently to *D. parumapertus marginatus*.

Figures 17 to 19 show the male and female plates of a tick which Neumann considered *D. electus*. Microscopic examination of the plates, however, shows that we are dealing with specimens of the *Andersoni* group, for the goblets are of medium size. In the male (fig. 17) the plate resembles that of the male *D. venustus* and *D. occidentalis* to some extent; in the female, the plate reminds one strongly of that of *D. parumapertus*. The convexity of the plate, the arrangement and the circular form of the goblets, the very large aperture and chamber, and the very broad anterior margin (*m*) of the prolongation clearly distinguish this form from all other forms discussed in this paper, with the possible exception of *D. parumapertus*. It is desirable to study a number of specimens of the latter in order to decide upon the relation which these two forms bear to each other.

SALMONI GROUP.

We may next pass to three species (*D. nigrolineatus*, *D. salmoni*, and *D. variegatus* Neumann [= *D. albipictus* Packard, teste Banks], which by means of their stigmal plates can be easily distinguished from all other species of *Dermacentor* discussed in this paper; it is more difficult to distinguish *salmoni* from *variegatus* by this means, but the latter is very pilose and of different outline from *salmoni*.

The goblets in these species are large, namely, usually 30 to 85 μ in diameter, and hence relatively few (56-126) in number when compared with the *reticulatus* group.

DERMACENTOR NIGROLINEATUS (Packard 1869) Banks, 1907.

(Figs. 20-25, 60-64, 77, 78, 93, 94, 112, 113, 129, 130.)

1869: *Ixodes nigrolineatus* Packard, 1869b, 66 (on *Cervus virginianus*, Northern New York).

1907: *Dermacentor nigrolineatus* (Packard, 1869) Banks, 1907, 608.

SPECIFIC DIAGNOSIS.—*Dermacentor* (p. 18): ♂ and young ♀: Caudal margin semicircular. Color (alcohol specimens) dirty yellow to reddish brown; capitulum and legs may be either lighter or darker than body and scutum. Dorsum: Eyes rather distinct, salient in female, less prominent in male. Scutum without rust, punctations small, with short hairs. Venter: Genital pore surrounded by hairs (♂) which are much less numerous and less prominent in female; entire cuticle quite pilose, much like *D. variegatus*. Anal ring nearly circular, slightly broader than long, transverse diameter (mounted specimens) about 252 μ , sagittal diameter 240 μ . Stigmal plates without any dorso-lateral prolongation; aperture relatively small, preequatorial in male, less distinctly so in female; goblets rather large, 15 to 53 μ in diameter, more numerous in post-

equatorial than in preequatorial portion. Capitulum: Postero-lateral projections prominent, about $80\ \mu$ long. Hypostome, each half with a number of minute subterminal denticles, followed proximally by three rows of six to eight large denticles, followed by several smaller scale-like denticles. Palpi, both lateral and median margins convex; two to three bristles on ventro-median margin of article 1; three to five on same margin of article 2; two to three on same margin of article 3; article 3 rather triangular, in dorsal view, its distal margin somewhat rounded; dorso-retrograde prolongation at postero-median angle of article 2 may be indicated, but is insignificant if present. Legs: Lateral (outer) spur on coxæ I somewhat narrower than median (inner) spur, but of about same length; trochanter I with prominent sharp retrograde spine-like distal spur; ventral margins of femur IV, tibia III-IV and protarsus IV may bear slight spurs or knobs, but these if present are not at all prominent; tarsi I with small terminal spur.

Male.—Length, 3.36 to 4.0 mm. long (exclusive of hind legs); greatest breadth, 1.99 to 2.5 mm. Body oval; unmounted specimens attain 0.88 mm. broad at scapulae; the sides diverge from here until they reach their maximum breadth at coxæ IV or at stigmal plates. Dorsum: Scutum covers nearly entire dorsum (except capitulum and caudal margin); scapulae project about 0.208 mm. from border of excavation; cervical grooves not prominent, more distinct anteriorly than posteriorly; marginal groove not distinct, except at sides in some specimens; scutum dirty yellow to brownish, without rust; pseudoscutum very indistinct (one specimen) or absent; eleven postero-marginal festoons, the median may be distinctly narrower than the others; numerous minute punctations with short hairs present. Foveolæ near median margin of coxæ IV, may attain 64 to $80\ \mu$ in diameter. Venter: Ventral surface thickly beset with hairs. Genital pore between coxæ II; genital groove distinct, diverging rapidly caudad of coxæ IV. Stigmal plate 0.455 to 0.546 mm. long, 0.224 to 0.336 mm. broad; goblets about 68 in number and 15 to $53\ \mu$ in diameter. Capitulum: Small, may attain about 0.504 mm. in length; base 0.464 to 0.48 mm. broad, 0.20 mm. long from posterior margin to anterior margin of portion over palpi; postero-lateral prolongations about $80\ \mu$ long. Mandibles about 0.656 to 0.704 mm. long; digit attains $120\ \mu$ in length; external article with rather large recurved proximal tooth (smaller subapical tooth not observed), and very minute apical tooth; dorsal process of internal article elongate transversely with two visor-like transverse ridges. Hypostome with six to eight large denticles in each row. Palpi 0.320 to 0.368 mm. long, each palpus attains 0.184 to 0.224 mm. in maximum breadth; article 2 with four, article 3 with two to three bristles on ventro-median edge. Legs: Coxæ, lateral spurs of II to IV prominent, median spurs of II to IV small or absent; tibia III and femur, tibia, and protarsus IV with or without slightly developed knobs or spurs; tarsi I with small or fairly well developed terminal spur, tarsi II to III with subterminal and terminal spurs, tarsi IV apparently with terminal spur only.

Young female.^a—Length 5 to 6.6 mm. (exclusive of hind legs); greatest breadth 3 to 3.3 (unmounted) to 4.99 mm. (mounted). Body rather elongate oval; unmounted specimens attain about 0.80 to 0.96 mm. broad at scapulae, specimens mounted under pressure attained only a slightly greater breadth, 0.992 mm.; the sides diverge from here to a maximum breadth about at coxæ III to IV, then they may run nearly parallel for a short distance or converge at first gradually, then more rapidly to bluntly rounded caudal margin. Dorsum: Scutum covers nearly 0.32 of body length (one specimen) (exclusive of capitu-

^aSpecimens poorly preserved as to form.

lum); 1.12 to 1.44 mm. long in median line; 0.992 to 1.312 mm. broad at lateral angles; rust absent; scapulæ project 0.176 mm. from border of excavation; from shoulders, the sides of the scutum curve (convexity laterad) to the lateral angles, then converge with somewhat sigmoid course to more or less pointed posterior angle. Cervical grooves distinctly deeper cephalad than caudad, each forming mediad the concave side of an hourglass. Punctations small, with fine hairs, but in unmounted material a few large punctations also are seen. Eyes rather salient, at lateral angles, very dark in unmounted, translucent in cleared specimen. Uncovered portion of dorsum shows numerous fine punctations (circular pores) with fine hairs; also several longitudinal grooves (which can not be safely interpreted because of shrunken condition of specimens). Foveolæ 32 μ in diameter, between coxæ IV. Venter: Punctations and fine hairs present, but not so numerous as in male; genital grooves diverge gradually, then form curve (convexity mediad) caudad of zone of coxæ IV, then diverge rapidly latero-caudad; median postanal groove apparently present (material poor). Stigmal plate relatively much broader and shorter than in male, 392 μ long by 308 to 378 μ broad; goblets attain about 103 in number, usually 24 to 52 by 24 to 40 μ in diameter, extremes 17 and 52 μ . Vulva in zone between coxæ I and II. Capitulum (only one good specimen): About 0.72 mm. long; base 0.502 mm. broad, and 0.282 mm. long from posterior margin to anterior margin of portion over palpi; postero-lateral angles 48 to 64 μ long, rather blunt; porose areas broad, do not meet in median line. Mandibles about 0.88 mm. long; digit 120 μ long; external article with large proximal recurved tooth, smaller subapical and very small apical tooth; dorsal process of internal article with two teeth. Hypostome with numerous minute subterminal denticles, followed by three rows of larger denticles on each half, ten or more in each row, disappearing first from median, then intermediate, lastly from external row. Palpi 0.416 to 0.464 mm. long; each palpus may reach a maximum of 0.192 to 0.224 mm. in breadth; article 2 may have five, article 3 may have three bristles on ventro-median margin. Legs: Coxæ I to IV diverge gradually away from median line; coxæ I and trochanter I about as in male; knobs or spurs on tibia III, femur, tibia, and protarsus IV not prominent; tarsi I with fairly well developed terminal spur; tarsi II to IV with terminal spur and two small subterminal knobs.

Replete female.—Not seen.

Nymphal skin.—Stigmal plate with 14 goblets (fig. 25).

TYPE.—Museum of Comparative Zoology, Cambridge, Mass.

Hosts.—Deer (New York, Wisconsin, Texas), *Equus caballus* (Oklahoma, Tennessee).

The specific diagnosis as given by Banks (1908, 48–49) reads as follows:

Male.—Rather pale red-brown, no white markings, but the black cæcal marks show through in most specimens as several irregular lines behind; legs more yellow-brown. Capitulum small and narrow, its posterior angles produced into long spines; palpi very small and stout. Dorsum slender, about one and two-thirds times as long as broad; middle anterior region smooth and shining, sides and behind densely punctured, and with many short hairs; lateral furrows not very distinct, twelve impressed lines behind, but the festoons are not as obvious as usual. Legs rather short, coxæ with usual spines, coxa IV but little wider at base than long; stigmal plate large, elliptical, without dorsal prolongation, and covered with many large granules.

Length of male, 3.5 mm.

Female.—Shield red-brown, without marks; legs similar; abdomen dark red-brown. Capitulum scarcely twice as broad as long; hind angles distinctly prolonged behind; porose areas large, oval, and distinctly separated; palpi small and short, not as long as width of capitulum. Shield plainly longer than broad, broadest much before the middle, tapering and almost pointed behind, with very few punctures. Legs small and short, the tarsi very short; coxæ with the usual spines, that on IV no longer than on III. Stigmal plate elliptical, of same shape as in male, no dorsal prolongation, and covered with many large granules.

Length of female shield, 1.2 mm.

Through the kindness of Mr. Nathan Banks I have been able to examine a male tick (U. S. P. H. & M. H. S. 10592) determined by him as *Dermacentor nigrolineatus*, host and locality not stated. This measures 3.46 mm. long by 1.99 mm. in greatest breadth.

The two stigmal plates (fig. 20) measure, respectively, 0.455 mm. long by 0.280 mm. broad, and 0.511 mm. long by 0.224 mm. broad. The outline of the plate is quite regular, without any indication of a dorso-lateral prolongation. There are 69 goblets present; these are circular to oval, 32 to 40 μ in diameter, and are more numerous in the postequatorial portion of the plate. The macula or pore is in the preequatorial portion of the plate.

Of other characters, the following may be mentioned:

The base of the capitulum (fig. 60) is 0.448 mm. broad; the postero-lateral angles project about 96 μ ; the palpi are about 320 μ . Trochanter I has a well-developed sharp dorso-distal retrograde spur. The venter is thickly beset with hairs, and hairs and pores are numerous around the male genital pore.

A male of U. S. P. H. & M. H. S. 9992 (mounted) appears to be specifically identical with Banks's specimen. It was collected in New York. According to our catalogue record it was determined by Banks as *D. variegatus*.

It measures 3.36 mm. long by 2.33 mm. broad; the stigmal plates measure 0.518 by 0.322 and 0.546 by 0.336 mm.

There is a single female specimen of 9992. Unfortunately it is damaged. Its scutum (fig. 78) measures 1.34 mm. long; the stigmal plates are less elongate than in the male; they measure 0.392 by 0.308 mm. and 0.392 by 0.378 mm. There are 66 goblets present, which measure 22 to 42 μ in diameter. The injured body measures (mounted) 6.6 mm. long by 4.99 mm. broad, without the capitulum, which is lost.

B. A. I. No. 4288 contains three female ticks collected from *Equus caballus* in Davidson County, Tenn., by J. C. Drake, January 11, 1906. Two unmounted specimens measure 5.75 to 7.5 mm. long. One mounted specimen measured shows a scutum 1.46 mm. long. The stigmal plates measure 0.490 by 0.420 and 0.490 by 0.399 mm. On one plate there are 103 goblets measuring 24 to 52 μ in diameter. The plates agree fairly well with those of 9992, but as seen from the

measurements they are somewhat larger. In absence of male specimens the specific determination is at present provisional, but I believe the specimens are specifically identical with 9992.

B. A. I. 4363, collected by W. B. Lincoln, January 18, 1906, at Bellaire, from *Equus caballus* (the host came from Oklahoma), agrees fairly well with Banks's specimen of *D. nigrolineatus*. A stigmal plate of a (nymph?) of 4363 is shown in figure 25.

Although the material at hand is not in very good condition, the characters given in the specific diagnosis could be recognized.

Salmon's Dermacentor—DERMACENTOR SALMONI new species.

(Figs. 26-36, 65, 66, 79, 95, 96, 114, 115, 131, 132.)

1901: *Dermacentor reticulatus* (Fabricius) of Salmon and Stiles, 1901a, 448-452, figs. 61, 169-177 [North American specimens only].—Banks, 1907, 608 (as syn. of *D. albipictus*); 1908, 55.—Hunter and Hooker, 1907, November 2, 50.

1910: *D. salmoni* Stiles, 1910, 55, figs. 26-36a, 65, 66, 79, 95, 96, 114, 115, 131, 132 (type host *Bos taurus*, in Oklahoma; type U. S. P. H. & M. H. S. 3191).

SPECIFIC DIAGNOSIS.—*Dermacentor* (p. 18): ♂, young and replete ♀: Caudal margin very bluntly rounded, anus nearer caudal than lateral margin. Color exceedingly variable, very light to very dark [when alive, No. 3179 changed color while being drawn, see figs. 169-172 of Salmon and Stiles, 1901a]. Dorsum: Eyes rather distinct. Scutum well provided with rust; punctations large and small. Venter: Genital pore surrounded by numerous hairs, especially in male. Anal ring nearly circular; in specimens mounted under pressure, 224 to 368 μ in longitudinal by 288 to 385 μ in transverse diameter. Stigmal plates with or without dorso-lateral prolongations; aperture (macula) rather elongate, not strikingly large; goblets about 50 to 100 in number, 26 to 85 μ in diameter, closely set and occupy nearly entire surface [these goblets correspond to the large wart-like punctations shown in figs. 170-177 of Salmon and Stiles, 1901a]; slightly deeper focus shows a finer structure of somewhat reticulate appearance, represented by the middle layer [and corresponding to the finer punctations in figs. 170-177 of Salmon and Stiles, 1901a]; in some parts of the plate, especially near the margin, these fine circles are visible at the same focus which shows the goblets, especially when the plate is slightly curved; the meshes vary in size and shape but may attain 8.8 to 17.6 μ in diameter; the deeper pores (stems of goblets) are about 8.8 μ in diameter; as focus is raised, these circular canals assume a compressed, slit-like outline. Capitulum: Postero-lateral projections short. External article apparently with either two or three teeth, the terminal tooth exceedingly minute, and apparently sometimes lacking, at least not visible, the subterminal tooth larger, proximal tooth largest. Hypostome, each half with small subterminal denticles, followed by three rows of strong denticles, followed proximally by smaller scale-like denticles. Palpi, article 1 triangular to nearly quadrangular ventrally, with two to four ventro-medial marginal bristles; article 2 with four to eight such bristles; article 3 slightly broader than long, its apex very blunt so that the article may appear almost quadrangular; a few subterminal and terminal bristles present; dorso-retrograde prolongation indicated on postero-medial margin. Legs: The lateral spur on coxae I may be slightly longer than the median spur; lateral spur of coxae II-IV unusually sharp; trochanter I with dorso-distal rather prominent retrograde spur; terminal spur on tarsi I-IV usually well developed.

Male.—Length 4.1 to 5.7 mm. long (exclusive of hind legs); greatest breadth 2.3 to 3.6 mm., near stigmal plate. Body rather oval, sides (unmounted) decidedly convex; 0.96 to 1.12 mm. broad at scapulæ. Dorsum: Scutum covers entire dorsum (except capitulum); scapulæ project 0.16 to 0.32 mm. from border of excavation; cervical and marginal grooves distinct; pseudoscutum not at all prominent; scutum deep reddish brown, usually concealed for the most part by a silver white metallic rust with rose and green tinges; when rust is pronounced, there remain a number of reddish to brown spots more or less symmetrically placed; the most prominent are: (a) Four elongate spots arranged in a semicircle or nearly so and running longitudinally; (b') two elongate lateral spots posterior of these, one on each side; (b'') a dark median spot between, on same plane as b' and covering foveolæ; (c) an elongate median spot and two elongate submedian spots; (d) the forked spot may be very prominent; several dark spots may be present in the postero-lateral festoons; numerous punctations present, with hairs. Marginal groove rather distinct. Foveolæ about at equator, and measuring 64 to 112 μ in diameter. Venter: Ventral surface with hairs and punctations which are noticeably more numerous around genital pore. Genital pore between coxæ II. Stigmal plates 0.518 to 0.714 mm. long by 0.294 to 0.406 mm. broad; goblets may attain 61 in number and 26 to 73 μ in diameter. Capitulum: Length, 0.490 to 0.640 mm. dorsally, 0.80 to 0.896 mm. ventrally; base, 0.48 to 0.576 mm. broad, only about half as long; postero-lateral projections may attain 112 μ long. Mandibles: 0.896 to 1.056 mm. long; digit, 120 μ ; dorsal process of internal article elongated transversely, with two well-developed visor-like ridges. Hypostome with numerous subterminal minute denticles which extend an unusual distance proximally in median line; about seven to eight large denticles in each row, followed by scale-like denticles. Each palpus 400 to 576 μ long, 224 to 320 μ broad; article 1 nearly quadrangular, with two to four ventro-median bristles; article 2 with five to six, article 3 with three to four bristles on ventro-median margin. Legs: Coxæ IV large, of two types, the caudal margin may extend to plane of caudal margin of stigmal plate.

Female.—Dorsum: Scutum 1.32 to 2.03 mm. long in median line; 1.376 to 1.84 mm. broad at lateral angles; decidedly emarginate anteriorly; scapulæ project about 0.24 to 0.352 mm. from border of emargination; breadth of scutum at shoulders (unmounted) 1.0 to 1.28 mm.; from shoulders, the sides of the scutum diverge in a somewhat irregularly curved or in a nearly straight line to the lateral angles, then converge in a straight or irregular line to the blunt postero-lateral angles, when they change direction, converging more rapidly to the bluntly rounded posterior angle; the postero-lateral angle may be effaced. Cervical grooves may be rather pronounced, diverging anteriorly and posteriorly from a transverse plane passing through the eyes; they are rather deep anteriorly, shallow and broad posteriorly; they divide scutum into three distinct longitudinal areas; surface of scutum provided with a number of more or less uniformly distributed fine punctations, each bearing a short bristle or hair; on slightly deeper focus they show also a number of larger structures composed of more or less circular spots, apparently forming the insertion of muscle fibers. Eyes light or dark, rather prominent, at lateral angles; rust well distributed, but absent at lateral angles and in grooves; rust may also be absent from a portion of median line and from a divergent line laterally of each posterior branch of cervical groove. Uncovered portion of dorsum shows coarser and finer punctations, with hairs, a distinct median and two submedian furrows; short furrows may appear antero-laterally of submedian furrows; marginal furrow not distinct. Foveolæ round to oval, 64 to 144 μ in diameter. Venter: Punctations and fine hairs present, genital

grooves run convex (laterad) caudally to a point slightly caudad of plane of coxæ IV, then they diverge toward the lateral margin; median postanal groove distinct in unmounted specimens. Stigmal plates 0.539 to 0.840 mm. long; 0.416 to 0.602 mm. broad; dorso-lateral projections short or absent; goblets attain about 70 in number and 26 to 85 μ in diameter. Capitulum: 0.608 to 0.768 mm. long (dorsally); base 0.608 to 0.704 mm. broad; 230 to 320 μ long from posterior margin to plane over palpi; dorso-lateral angles not very prominent, project 48 to 80 μ , blunt; porose areas deep, distinct and round, but in one specimen they meet in median line. Mandibles attain 0.8 to 1.13 mm. in length, digit 128 to 144 μ ; dorsal process apparently bidentate, with base near terminal extremity. Smaller anterior denticles of hypostome confined to smaller area than in male, may be nearly absent; seven to ten large denticles in each longitudinal row, continued proximally by scales; first transverse row of large denticles may be somewhat irregular and may show four teeth. Palpi 0.448 to 0.608 mm. long by 0.240 to 0.324 mm. broad; dorsal retrograde projections small; article 2 about as broad as long; article 3 broader than long; its apex blunt so that it appears almost quadrangular dorsally; article 1 triangular ventrally, with three to four bristles; article 2 with four to eight bristles; article 3 with two to three bristles. Legs: Coxæ diverge I to IV; lateral spine of coxæ I may attain 256 μ long; ventral margin of protarsus and tarsus II, femur, tibia, protarsus and tarsus III, and tibia, protarsus, and tarsus IV may have small knobs.

Replete female.—May attain 17 mm. long by 12 mm. broad. Form varies with degree of repletion; legs I are lateral of scutum; from here body increases rapidly in breadth, reaching a maximum at about coxæ IV; there may be a constriction at plane of the foveolæ or at stigmata; posterior margin is very bluntly rounded, so that anus may be nearer posterior than lateral margin. (See Salmon and Stiles, 1901a, figs. 171-172). Foveolæ slightly preequatorial. Color is exceedingly variable; live specimens may change color while under observation, especially if background is changed; live specimens may be whitish to creamy color to a greenish or brown; alcohol specimens may be greenish to brown or even black. Dorsum: Dorsal surface may show two prominent longitudinal grooves, diverging slightly caudad and interrupted just caudad of foveolæ; a median groove extending from near foveolæ about to anus. Venter: Vulva may shift slightly forward of coxæ II or even to plane of spines on coxæ I; genital and anal grooves prominent. Legs: Coxæ I-IV diverge markedly.

Nymph.—A nymphal skin, about 4.5 mm. long, shows a stigmal plate 192 by 152 μ , with 17 goblets.

TYPE.—B. A. I. 3179.

HOSTS.—Horse (*Equus caballus*) in Tennessee; cattle (*Bos taurus*) in Oklahoma; collected also in Montana, and (?) Oregon.

Salmon and Stiles (1901a, 448-452, figs. 61, 169-177) confused with *Dermacentor reticulatus* of Europe certain American ticks which prove, from a study of the stigmal plates, to be distinct from the European form.

B. A. I. 2998 (see fig. 176 of Salmon and Stiles, 1901a) consists of five mounted specimens, one male, four females, none in very good condition. They were taken from *Bos taurus*; locality unknown; determined by Banks in 1898 as *D. 5-striatus*; determined by Stiles in 1901 as *D. reticulatus*. The stigmal plates are quite distinct from

those of *D. variegatus* and of *D. nigrolineatus*. They present the following measurements in mm.:

Stigmal plates.	Body.	Size of scutum.	Breadth of base of capitulum.	Remarks.
Male: 0.714×0.490		(?)	0.576	Mounted, pressed.
Female: 0.658×0.420 ; 0.616×0.420	ca. 12×10	1.68 long.	.784	Do.
Female: 0.658×0.504	ca. 10×8	1.456 \times 1.376	.640	Do.
Female: 0.623×0.448	6.6×4.86	1.328 \times 1.42	.688	Do.
Female: $0.539 \times$ —; 0.574×0.364	ca. 11×7			

There is a very slight tendency, both in the male and in the female, to the formation of a dorso-lateral projection. The goblets (fig. 27) may attain 79 in number and 32 to 80 μ in diameter. The trochanter has a dorso-distal retrograde spur.

U. S. P. H. & M. H. S. 9724 contains two specimens (one male, one female), collected in Montana by Maj. P. M. Ashburn, U. S. Army; host is not given (horse ?); they possess certain striking resemblances to 2998, yet certain differences are noticed. Whether these differences are of specific value or individual variations can not be determined at present because of paucity of material. The following are the measurements in mm.:

Stigmal plates.	Body.	Size of scutum.	Breadth of base of capitulum.	Remarks.
Male: 0.518×0.378 ; 0.518×0.378	4.129×2.331		0.490	Mounted, pressed.
Female: 0.644×0.476 ; 0.644×0.476	4.928×2.797	1.84×1.84	.688	Do.

The striking difference to be noticed is the regularity of outline of the male plate as compared with that of 2998; the female plate agrees more closely with that of 2998. In number the goblets are 54 to 58 in the male and 51 to 55 in the female and 30 to 85 μ in size. Figures 28–34 show the two pairs of stigmal plates from two specimens and indicate that we have here a species which may exhibit considerable variation.

B. A. I. 3179 (compare figs. 169–172 of Salmon and Stiles, 1901a) contains four mounted specimens of fragments of three females; they were collected from *Bos taurus* in Oklahoma by W. F. Cantalow; determined by Stiles in 1901 as *D. reticulatus*. They appear to agree with 2998. The measurements, in millimeters, are as follows:

Stigmal plates.	Body.	Size of scutum.	Breadth of capitulum.	Remarks.
Female: 0.672×0.560 ; 0.686×0.560		2.03×1.76	0.752	Mounted, pressed.
Female: 0.616×0.518 ; 0.630×0.518	ca. 6×5			Do.
Female: $\$0.840 \times$ —; $\$0.800 \times 0.608$	ca. 8×6			Do.

This material is not very satisfactory, but, despite the large stigmal plate in one specimen, it is impossible at present for me to distinguish between these ticks and 2998. Figure 26, from this material, shows 78 goblets, 26 to 65 μ in diameter.

B. A. I. 3206 contains two mounted and twelve unmounted females, collected by Doctor Steddom from *Equus caballus* at Nashville, Tenn., February 27, 1901. Here again the general agreement of the plates with 2998 is very striking, despite certain pronounced differences. Still, as the plates on the two sides on single mounted specimens vary one from the other, it does not seem altogether justified to consider the form distinct from 2998. The millimeter measurements of the mounted specimens are as follows:

Stigmal plates.	Body.	Length of scutum.	Breadth of capitulum.	Remarks.
Female: 0.616×0.504; 0.616× —	ca. 14×12			Mounted, pressed.
Female: 0.630×0.462				Do.

The goblets are about 71 in number and vary from 28 to 48 μ in diameter. A gravid, unmounted female attains about 17 mm. in length by 12 mm. in breadth.

U. S. P. H. & M. H. S. 10003, collected by Dr. E. C. Stevenson, contains four males and one female presenting the following measurements in mm.:

Stigmal plates.	Body.	Size of scutum.	Breadth of capitulum.	Remarks.
Male: 0.588×0.336	5.43×3.19		0.576	Mounted, pressed.
Male: 0.602×0.322; 0.602×0.280	5.46×3.26		.576	Do.
Male: 0.638×0.364; 0.700×0.294	5.72×3.66		.640	Do.
Male: 0.700×0.350; 0.672×0.406	5.66×2.79		.608	Do.
Female: 0.560×0.420; 0.560×0.420	5.06×3.19	1.606×1.680	.768	Do.

These specimens present very marked variations among themselves and when compared with the other specimens listed here. The female plate agrees fairly well with 2998, but the male plates are quite different, being of a much more elongate pattern. Figure 36 shows a plate with 61 goblets measuring 30 to 60 μ in diameter. The variation in form and size of coxæ IV of the males is very striking.

The following specimens have been examined:

- B. A. I. 2998. Host *Bos taurus*; loc. ? ; 1898; determined by Banks, 1898, as *Dermacentor 5-striatus*; determined by Stiles, 1901, as *D. reticulatus*.
- B. A. I. 3179. Host *Bos taurus*; Oklahoma; collected by W. F. Cantalow; determined by Stiles, 1901, as *D. reticulatus*.
- B. A. I. 3026. Host *Equus caballus*; Nashville, Tenn.; collected by Steddom, February 27, 1901.

- U. S. P. H. & M. H. S. 9724. Host— ? ———; Montana; collected by Maj. P. M. Ashburn, U. S. Army.
- U. S. P. H. & M. H. S. 9756. Male and female from U. S. National Museum; bears the label "*Ixodes oregonensis*," but without further data.
- U. S. P. H. & M. H. S. 9769. Belongs to U. S. National Museum, original No. 1348; no further data.
- U. S. P. H. & M. H. S. 10003. Received from Dr. E. C. Stevenson.

In the specimens just listed, we evidently have *dermacentors* which agree very closely in respect to their goblets, scuta, and base of capitulum. The outline of the stigmal plate varies exceedingly, its size moderately. In order to determine whether these variations are individual or specific, it is desirable to have a large number of specimens taken from one host animal. At present, despite the variations mentioned, I do not feel justified in separating the forms into distinct species, although it seems very possible that 10003 may eventually be separated out as a distinct systematic unit.

The original determination of *D. reticulatus* for this species was based upon specimens found in the collection of the Bureau of Animal Industry. Later, they were recognized as distinct. Banks (1907, 608), on basis of the figure Salmon and Stiles (1901a, fig. 177) published of the stigmal plate identified the form with *D. variegatus* = *D. albipictus*, but in this he has been led into error.

DERMACENTOR ALBIPICTUS Packard, 1869 seu VARIEGATUS Marx, 1897.

(Figs. 37–39, 67, 68, 80, 97, 98, 116, 117, 133.)

- 1868: *The Moose Tick* Hays and Packard, 1868, December, 559, fig. 1a–e (on the Moose; Nova Scotia).
- 1869: *Dermacentor albipictus* Packard, 1869, 662–663; 1869, 365–366.
- 1897: *D. variegatus* Marx and Neumann, in Neumann, 1897a, 367–370, 383, figs. 22–24 (type locality U. S. A.).—Salmon and Stiles, 1901a, 452–454, figs. 178–185.

Banks (1907, 608) has identified *D. variegatus* with *D. albipictus*. He tells me that he has examined the type of both and that there is no question regarding their identity. On his authority they are here accepted as synonymous. He also considers "*D. reticulatus*" of Salmon and Stiles as belonging to the same species, but as will be shown in this paper I can not concur with him in this view.

The specimens used as basis for the present discussion of *D. albipictus* are *D. variegatus*.

SPECIFIC DIAGNOSIS.—*Dermacentor* (p. 18): ♂ and young ♀: Caudal margin very blunt, anus being nearer posterior than lateral margin. Color red to deep reddish brown, except for rust; capitulum and legs lighter. Dorsum: Eyes not very prominent. Scutum prominently emarginate cephalad; rather well provided with whitish rust, which varies considerably in different specimens; punctations and hairs numerous. Venter: Genital pore surrounded by numerous hairs, especially in male. Anal ring nearly circular, 320 μ long by 368 μ broad. Stigmal plates may be about as large as female coxæ IV; with or without short dorso-lateral prolongation; aperture rather prominent; goblets large, rather

irregular in outline, 108 to 126 in number, 8 to 50 μ in diameter, closely set and occupy nearly or quite entire surface (see also Salmon and Stiles, 1901a, figs. 184, 185); meshes of middle layer about 8 μ in diameter; stem of goblets about 8 μ in diameter, circular on lower focus, but compressed, slit-like on higher focus. Capitulum: Postero-lateral projections of base 80 to 124 μ long, blunt. External article with three teeth, the proximal tooth large, next distal tooth smaller, disal tooth apical and often scarcely visible. Hypostome, each half with an unusually large number of small subterminal denticles, followed by three rows of strong denticles, followed proximally by small scale-like denticles. Palpi, article 1 nearly quadrangular ventrally, provided with four to five ventro-marginal bristles; article 3 slightly broader than long, its apex somewhat rounded, a few dorso-terminal and terminal bristles; dorso-retrograde prolongations of article 2 indicated on postero-median margin. Legs: The lateral spur of coxæ I slightly longer than the median; lateral spurs of coxæ II-IV unusually sharp; trochanter I with a dorso-distal rather prominent retrograde spine; terminal recurved spur on tarsi I-IV well developed.

Male.—Length 6.5 mm. (exclusive of hind legs; with hind legs outstretched, about 8 mm.); greatest breadth 4.3 mm. Body subtriangular; unmounted specimens 1.12 mm. broad at scapulæ, specimens mounted under pressure may measure up to 1.2 mm. at this point; the sides diverge from here in nearly a straight or in a curved line until they reach their maximum divergence about at stigmal plate. Dorsum: Scutum covers entire dorsum (except capitulum); scapulæ project 0.40 to 0.48 mm. from border of excavation; cervical groove very deep anteriorly, marginal groove distinct; scutum deep reddish brown, well provided with rust; pseudoscutum usually quite prominent, extending about 0.35 of length of scutum in median line; the most prominent red spots back of pseudoscutum are: (a) Four elongate spots arranged radially or nearly so from caudal margin of pseudoscutum; (b) two elongate spots back of these, one on each side of the scutum; (c) an elongate median and two elongate sub-median spots; (d) forked spot very prominent; spots also present on postero-lateral margins; numerous minute punctations and some slightly larger punctations, with hairs present. Foveolæ about in equator of scutum and measuring 96 μ in diameter. Venter: Ventral surface finely punctate with numerous minute white hairs, noticeably more numerous and larger punctations around genital pore. Genital pore between coxæ II. Stigmal plates 0.688 to 0.848 mm. long (through the aperture); breadth of plate (including prolongation when present) 0.48 to 0.683 mm.; goblets attain 126 in number and 15 to 59 μ in diameter. Capitulum: 0.700 to 0.816 mm.; base 0.688 to 0.80 mm. broad, and 0.368 mm. long from posterior margin to anterior margin over palpi; postero-lateral projections rounded, 128 μ long. Mandibles 1.1 to 1.2 mm. long; digit 185 μ ; dorsal process of internal article elongate transversely in two nearly parallel ridges like two visors of a cap. Hypostome with six to eight large denticles in each row. Palpi 0.56 to 0.672 mm. long, each palpus 0.32 to 0.352 mm. in maximum breadth; shorter than in female, especially article 2; article 2 with six to seven ventro-median bristles; article 3 with three to four ventro-median bristles. Legs: Coxæ IV large, the caudal margin attaining plane of caudal margin of stigmal plate, the median margins nearly parallel for some distance; ventral spurs or knobs may be present on tarsus I, protarsus and tibia II, and especially on femur, tibia, protarsus, and tarsus IV; tarsi II to IV with subterminal spur.

Female.—Dorsum: Scutum 1.776 to 2.128 mm. long in median line; 1.8 to 1.9 mm. broad at lateral angles; very prominent because of size and rust; scapulæ project about 0.468 mm. from border of excavation; from shoulders sides of scutum diverge in rather strongly convex line to lateral angles, then

converge in straight or somewhat convex line to postero-lateral angles, then they converge more rapidly to the bluntly rounded posterior angle. Cervical grooves diverge anteriorly and posteriorly from plane passing through the eyes, deeper anteriorly, not especially broad posteriorly; eyes at lateral angles; punctations fine and numerous; color light brown with thin white rust of slightly metallic effect and leaving exposed a median longitudinal band, the cervical grooves, a small band laterally of posterior branch of grooves, and a distinct brown spot median of eyes. Uncovered portion of dorsum shows numerous punctations with hairs, a distinct median, two submedian, and well marked marginal grooves; additional grooves may appear between submedian and marginal grooves. Foveolæ round to oval, 128 to 144 μ in diameter, a short distance caudad of scutum. Venter: Numerous punctations and fine hairs present; genital grooves run subparallel to a point about midway between coxæ IV and anus, whence they diverge markedly toward lateral margin. Stigmal plates 0.736 to 0.784 mm. long by 0.64 to 0.70 mm. broad; goblets 8 to 49 μ in diameter, may attain 108 (in nymph 14) in number. Capitulum: 0.8 to 1 mm. long; base 0.768 to 0.8 mm. broad; 0.288 mm. long from posterior margin to anterior margin over palpi; postero-lateral prolongations 80 μ ; porose areas deep, roundish to rather oval, diverging anteriorly. Mandibles attain 1.28 to 1.42 mm. long; digit 180 μ long; internal apophysis (dorsal process) distinctly tridentate, the median tooth shortest. Smaller anterior denticles of hypostome numerous; nine to ten large denticles in each row. Palpi may attain 0.768 mm. ventrally, by 256 to 320 μ broad, not extending laterally of base of capitulum; article 2 longer than broad; dorso-retrograde projection small; article 3 slightly broader than long, its apex rounded; article 1 with seven ventro-median bristles; article 2 and with nine ventro-median bristles; article 3 with three ventro-median bristles. Legs: Coxæ diverge II to IV; lateral spine of coxæ IV may attain 320 μ long; ventral margin of tibia and tarsus II, femur, tibia, protarsus and tarsus III, and tarsus IV may have small knobs.

Young female.—Length 5.5 to 6 mm. (exclusive of hind legs; with hind legs extended may attain 8 mm.); greatest breadth 3 mm. Body rather subtriangular, depressed, sides may be nearly straight and nearly parallel for some distance; unmounted specimens 1.28 mm. broad at scapulæ, specimens mounted under pressure may attain 1.28 mm. at this point; the sides diverge from here to the maximum breadth about at coxæ IV or at stigmal plate. Dorsum: Scutum covers about 0.40 of length of body (exclusive of head); eyes distinct but not prominent. Venter: Vulva between coxæ II.

Replete female.—May attain 17 mm. long by 10 mm. broad. Form varies with degree of repletion.

Nymph.—Length 5 to 6 mm.; breadth 3 to 3.5 mm.; sides nearly parallel; both ends bluntly rounded; anus nearer lateral than posterior margin. Goblets about 14 in number.

TYPE.—Type-specimen of *D. albipictus* is, teste Banks, in the Museum of Comparative Zoology.

HOSTS.—Moose, wapiti, and beaver.

The stigmal plate in this species was figured by Salmon and Stiles (1901a, figs. 184–185) from specimens not treated with caustic, and the fact was pointed out that it was coarsely punctate. From the new point of view, these coarse punctations represent the goblets.

The first reference to the moose tick appears to be the following:

The moose tick.—On the 13th of April a pair of young moose were brought through New York on their way to Europe. They were raised in Nova Scotia,

and being very tame, were allowed to run at large. The cow moose would ramble off in the woods, and while there had become infested with ticks; the bull had escaped contact with these insects. When the cow arrived in New York her sides and back were almost covered with adult ticks. The insects were removed, very much to the relief of the animal, and the ticks were placed in a bottle without food or water. On the 1st of May they commenced to lay eggs, and continued to do so until the 25th of June, when they died. The eggs are forced out in large masses. On the 3d of July, the day after I sent the drawings to you, the entire mass of eggs seemed to hatch out at once, the shell opening like a clam, and releasing a six-legged insect.—W. J. Hays.

[The specimens sent us by Mr. Hays are very interesting, as showing that the young tick has only three pairs of legs instead of four, which all adult spiders and mites (*Arachnida*) possess. This is a strong argument for the supposition that the *Arachnids* form an order in the class of insects and not an independent class. Figure 1 e represents the adult tick, drawn by Mr. Hays. The six-footed young has enormous legs, and the head is separated from the hind body, where in the adult it is sunken in the thorax; d, shows the claws, with a broad sucking disk beneath, enabling it to adhere to objects. On the right is a magnified drawing of the mouth parts of the young; a, is the labium, armed with hooks; b, the maxillæ, probably, also armed with powerful hooks; and c, the mandibles. Thus armed, the young tick buries itself in the flesh of its victim.—Eds.]—*Amer. Nat.*, v. 2 (10), 1868, p. 559.

Packard (1869, September, 365; 1869, 662–663) republished the figures, but added no details except that “the opening of the oviduct is just behind the head, between the anterior pair of feet, so that the eggs appear as if ejected from the mouth.”

The specimens taken as basis for the present study are:

B. A. I. 3172. Host Wapiti or moose; Blue Mountain, New Hampshire; determined by Stiles and Hassall, 1899, as *D. variegatus*.

Banks has examined specimens from Adirondack Mountains, New York; Michigan, Nebraska, Montana, Idaho, Nevada, and Washington State.

NITENS GROUP.

DERMACENTOR NITENS Neumann, 1897.

(Figs. 40–43, 69, 70, 81, 99, 100, 118, 119, 134.)

1897: *Dermacentor nitens* Neumann, 1897a, 376–378, fig. 28 (on *Equus caballus*; Jamaica, also Santo Domingo).—Banks, 1908, 50–51, pl. 7, figs. 7, 10; (Jamaica, Santo Domingo, Texas, Haiti).—Salmon and Stiles, 1901a, 455, figs. 215–218 (*Equus caballus*; Porto Rico).

The peculiar structure of the stigmal plates of this species was noticed by Neumann. In the present paper it will be sufficient to show illustrations from the new point of view of the goblets (see figs. 40 to 43).

In a male specimen examined the goblets were five in number and varied from 43 to 88 μ in diameter. In a female, the goblets were six in number and varied from 78 to 115 μ in diameter.

Banks (1908, p. 51) reports this species from Jamaica, Santo Domingo, Haiti, Texas, and Arizona.

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LIST OF HYGIENIC LABORATORY BULLETINS OF THE PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE.

The Hygienic Laboratory was established in New York, at the Marine Hospital on Staten Island, August, 1887. It was transferred to Washington, with quarters in the Butler Building, June 11, 1891, and a new laboratory building, located in Washington, was authorized by act of Congress, March 3, 1901.

The following *bulletins* [Bulls. Nos. 1-7, 1900 to 1902, Hyg. Lab., U. S. Mar. Hosp. Serv., Wash.] have been issued:

*No. 1.—Preliminary note on the viability of the *Bacillus pestis*. By M. J. Rosenau.

No. 2.—Formalin disinfection of baggage without apparatus. By M. J. Rosenau.

*No. 3.—Sulphur dioxide as a germicidal agent. By H. D. Geddings.

*No. 4.—Viability of the *Bacillus pestis*. By M. J. Rosenau.

No. 5.—An investigation of a pathogenic microbe (*B. typhi murium* Danyz) applied to the destruction of rats. By M. J. Rosenau.

*No. 6.—Disinfection against mosquitoes with formaldehyd and sulphur dioxide, By M. J. Rosenau.

No. 7.—Laboratory technique: Ring test for indol, by S. B. Grubbs and Edward Francis; Collodium sacs, by S. B. Grubbs and Edward Francis; Microphotography with simple apparatus, by H. B. Parker.

By act of Congress approved July 1, 1902, the name of the "United States Marine-Hospital Service" was changed to the "Public Health and Marine-Hospital Service of the United States," and three new divisions were added to the Hygienic Laboratory.

Since the change of name of the Service the bulletins of the Hygienic Laboratory have been continued in the same numerical order, as follows:

*No. 8.—Laboratory course in pathology and bacteriology. By M. J. Rosenau. (Revised edition, March, 1904.)

*No. 9.—Presence of tetanus in commercial gelatin. By John F. Anderson.

No. 10.—Report upon the prevalence and geographic distribution of hookworm disease (uncinariasis or ancylostomiasis) in the United States. By Ch. Wardell Stiles.

*No. 11.—An experimental investigation of *Trypanosoma lewisi*. By Edward Francis.

*No. 12.—The bacteriological impurities of vaccine virus; an experimental study. By M. J. Rosenau.

*No. 13.—A statistical study of the intestinal parasites of 500 white male patients at the United States Government Hospital for the Insane; by Philip E. Garrison, Brayton H. Ransom, and Earle C. Stevenson. A parasitic roundworm (*Agamomermis culicis* n. g., n. sp.) in American mosquitoes (*Culex sollicitans*); by Ch. Wardell Stiles. The type species of the cestode genus *Hymenolepis*; by Ch. Wardell Stiles.

No. 14.—Spotted fever (tick fever) of the Rocky Mountains; a new disease. By John F. Anderson.

No. 15.—Inefficiency of ferrous sulphate as an antiseptic and germicide. By Allan J. McLaughlin.

*No. 16.—The antiseptic and germicidal properties of glycerin. By M. J. Rosenau.

*No. 17.—Illustrated key to the trematode parasites of man. By Ch. Wardell Stiles.

*No. 18.—An account of the tapeworms of the genus *Hymenolepis* parasitic in man, including reports of several new cases of the dwarf tapeworm (*H. nana*) in the United States. By Brayton H. Ransom.

*No. 19.—A method for inoculating animals with precise amounts. By M. J. Rosenau.

*No. 20.—A zoological investigation into the cause, transmission, and source of Rocky Mountain "spotted fever." By Ch. Wardell Stiles.

No. 21.—The immunity unit for standardizing diphtheria antitoxin (based on Ehrlich's normal serum). Official standard prepared under the act approved July 1, 1902. By M. J. Rosenau.

*No. 22.—Chloride of zinc as a deodorant, antiseptic, and germicide. By T. B. McClintic.

*No. 23.—Changes in the Pharmacopœia of the United States of America. Eighth Decennial Revision. By Reid Hunt and Murray Galt Motter.

No. 24.—The International Code of Zoological Nomenclature as applied to medicine. By Ch. Wardell Stiles.

No. 25.—Illustrated key to the cestode parasites of man. By Ch. Wardell Stiles.

No. 26.—On the stability of the oxidases and their conduct toward various reagents. The conduct of phenolphthalein in the animal organism. A test for saccharin, and a simple method of distinguishing between cumarin and vanillin. The toxicity of ozone and other oxidizing agents to lipase. The influence of chemical constitution on the lipolytic hydrolysis of ethereal salts. By J. H. Kastle.

No. 27.—The limitations of formaldehyde gas as a disinfectant with special reference to car sanitation. By Thomas B. McClintic.

*No. 28.—A statistical study of the prevalence of intestinal worms in man. By Ch. Wardell Stiles and Philip E. Garrison.

*No. 29.—A study of the cause of sudden death following the injection of horse serum. By M. J. Rosenau and John F. Anderson.

No. 30.—I. Maternal transmission of immunity to diphtheria toxine. II. Maternal transmission of immunity to diphtheria toxine and hypersusceptibility to horse serum in the same animal. By John F. Anderson.

No. 31.—Variations in the peroxidase activity of the blood in health and disease. By Joseph H. Kastle and Harold L. Amoss.

No. 32.—A stomach lesion in guinea pigs caused by diphtheria toxine and its bearing upon experimental gastric ulcer. By M. J. Rosenau and John F. Anderson.

No. 33.—Studies in experimental alcoholism. By Reid Hunt.

No. 34.—I. *Agamoflaria georgiana* n. sp., an apparently new roundworm parasite from the ankle of a negress. II. The zoological characters of the roundworm genus *Filaria* Mueller, 1787. III. Three new American cases of infection of man with horse-hair worms (species *Paragordius varius*), with summary of all cases reported to date. By Ch. Wardell Stiles.

*No. 35.—Report on the origin and prevalence of typhoid fever in the District of Columbia. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle. (Including articles contributed by Ch. Wardell Stiles, Joseph Goldberger, and A. M. Stimson.)

No. 36.—Further studies upon hypersusceptibility and immunity. By M. J. Rosenau and John F. Anderson.

No. 37.—Index-catalogue of medical and veterinary zoology. Subjects: Trematoda and trematode diseases. By Ch. Wardell Stiles and Albert Hassall.

No. 38.—The influence of antitoxin upon post-diphtheritic paralysis. By M. J. Rosenau and John F. Anderson.

No. 39.—The antiseptic and germicidal properties of solutions of formaldehyde and their action upon toxines. By John F. Anderson.

No. 40.—1. The occurrence of a proliferating cestode larva (*Sparganum proliferum*) in man in Florida, by Ch. Wardell Stiles. 2. A reexamination of the type specimen of *Filaria restiformis* Leidy, 1880=*Agamomermis restiformis*, by Ch. Wardell Stiles. 3. Observations on two new parasitic trematode worms: *Homalogaster philippinensis* n. sp., *Agamodistomum nanus* n. sp., by Ch. Wardell Stiles and Joseph Goldberger. 4. A reexamination of the original specimen of *Tania saginata abietina* (Weinland, 1858), by Ch. Wardell Stiles and Joseph Goldberger.

*No. 41.—Milk and its relation to the public health. By various authors.

No. 42.—The thermal death points of pathogenic micro-organisms in milk. By M. J. Rosenau.

No. 43.—The standardization of tetanus antitoxin (an American unit established under authority of the act of July 1, 1902). By M. J. Rosenau and John F. Anderson.

No. 44.—Report No. 2 on the origin and prevalence of typhoid fever in the District of Columbia, 1907. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle.

No. 45.—Further studies upon anaphylaxis. By M. J. Rosenau and John F. Anderson.

No. 46.—*Hepatozoon perniciosum* (n. g. n. sp.); a hæmogregarine pathogenic for white rats; with a description of the sexual cycle in the intermediate host, a mite (*Lelaps echidninus*). By W. W. Miller.

No. 47.—Studies on Thyroid.—I. The relation of Iodine to the Physiological Activity of Thyroid Preparations. By Reid Hunt and Atherton Seidell.

No. 48.—The Physiological Standardization of Digitalis. By Charles Wallis Edmunds and Worth Hale.

No. 49.—Digest of comments on the United States Pharmacopœia. Eighth decennial revision for the period ending December 31, 1905. By Murray Galt Motter and Martin I. Wilbert.

No. 50.—Further studies upon the phenomenon of anaphylaxis. By M. J. Rosenau and John F. Anderson.

No. 51.—Chemical tests for blood. By J. H. Kastle.

No. 52.—Report No. 3 on the origin and prevalence of typhoid fever in the District of Columbia (1908). By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle.

No. 53.—The influence of certain drugs upon the toxicity of acetanilide and antipyrine. By Worth Hale.

No. 54.—The fixing power of alkaloids on volatile acids and its application to the estimation of alkaloids with the aid of phenolphthalein or by the Volhard method. By Elias Elvove.

No. 55.—Quantitative pharmacological studies—adrenalin and adrenalin-like bodies. By W. H. Schultz.

No. 56.—Milk and its relation to the public health. [Revised edition.] By various authors.

No. 57.—I. The presence of tubercle bacilli in the circulating blood in clinical and experimental tuberculosis. By John F. Anderson. II. The viability of the tubercle bacillus. By M. J. Rosenau.

No. 58.—Digest of comments on the Pharmacopœia of the United States of America (eighth decennial revision) and the National Formulary for the period ending December 31, 1906. By Murray Galt Motter and Martin I. Wilbert.

No. 59.—The oxidases and other oxygen catalysts concerned in biological oxidations. By Joseph Hoeing Kastle.

No. 60.—A study of the anatomy of *Watsonius* (n. g.) *watsoni* of man, and of 19 allied species of mammalian trematode worms of the superfamily *Paramphistomoidæ*. By Ch. Wardell Stiles and Joseph Goldberger.

No. 61.—Quantitative pharmacological studies: Relative physiological activity of some commercial solutions of epinephrin. By W. H. Schultz.

No. 62.—The taxonomic value of the microscopic structure of the stigmal plates in the tick genus *Dermacentor*. By Ch. Wardell Stiles.

In citing these bulletins, beginning with No. 8, bibliographers and authors are requested to adopt the following abbreviations: Bull. No. —, Hyg. Lab., U. S. Pub. Health & Mar.-Hosp. Serv., Wash., pp. —.

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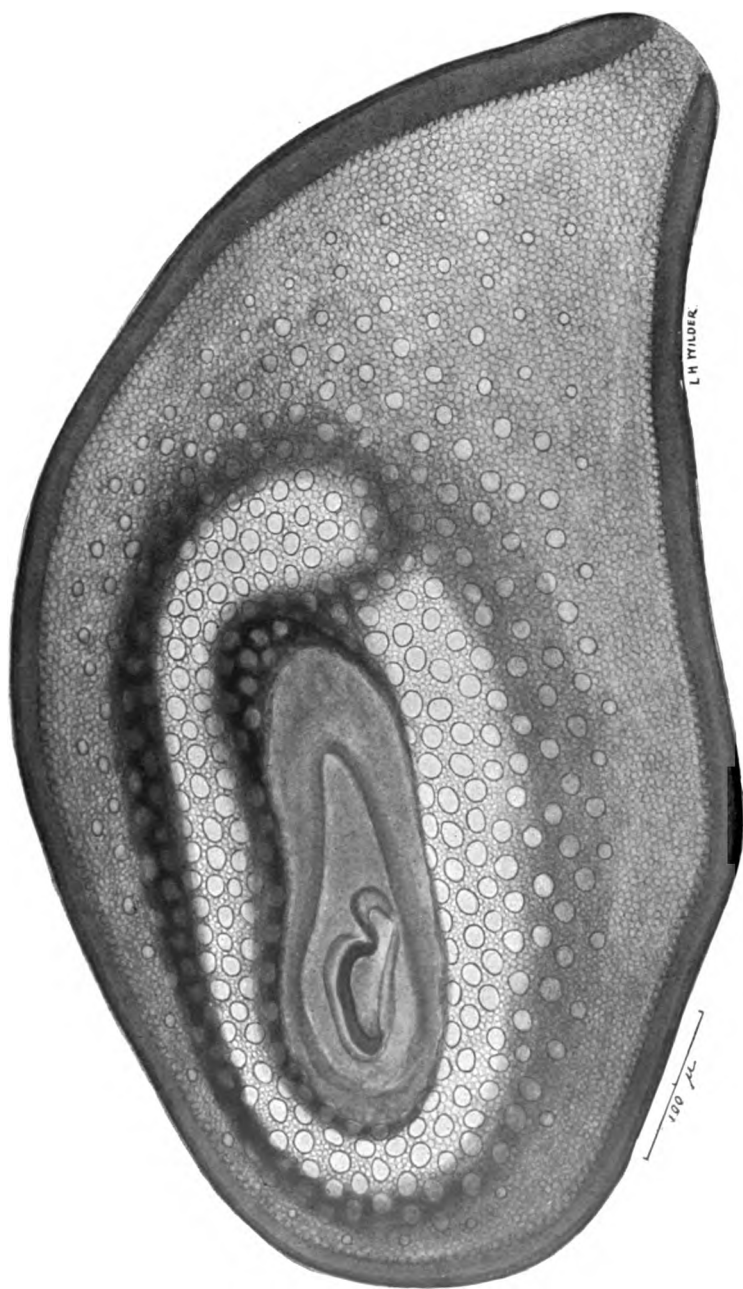


FIG. 1.—Stigmatal plate of male of *Dermacenter reticulatus* of France. Notice the elongate form of the plate, with the caudally situated short dorso-lateral prolongation; the aperture is elongate, cephalad, and mediad of the center; the outline of the relatively large chamber under the aperture is seen; the goblets are numerous (378) and are much more thickly set near the aperture than near the periphery; toward the prolongation the goblets become sparse and smaller; the middle layer is visible as composed of very numerous circles which form a mesh work; upon examination with a hand lens the goblets appear as fine punctations, while at the periphery the circles of the middle layer may appear as excessively minute punctations. Greatly enlarged. Original. B. A. I. 3904.

D. reticulatus ♀

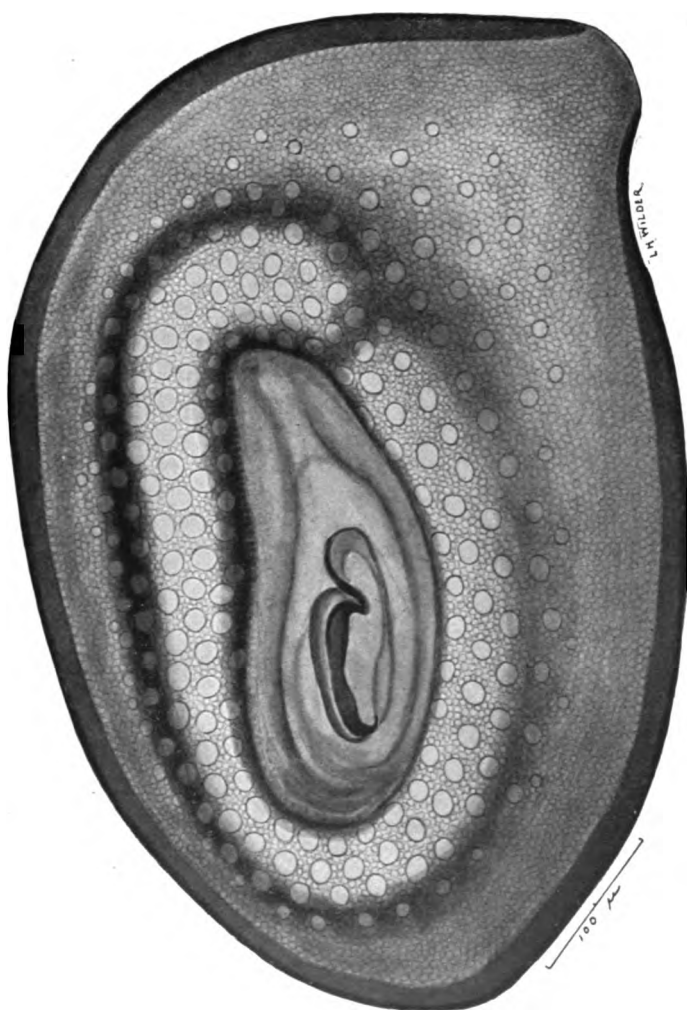


FIG. 2.—Stigmatal plate of female of *D. reticulatus*. Notice that this is relatively less elongate than the male plate, but otherwise of the same general structure. Goblets are 215 in number. Greatly enlarged. Original. B. A. I. 3804.

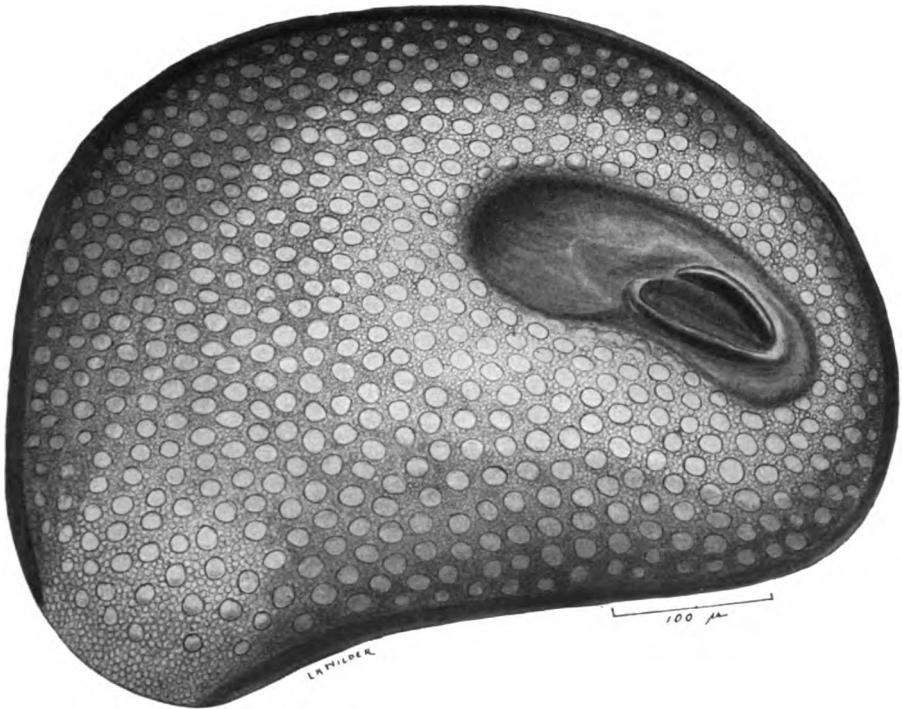
D. electus ♂

FIG. 3.—Surface view of stigmal plate of male *D. electus* [*D. variabilis*]. Notice the location of the aperture near the ventro-median-anterior margin; the plate is not so elongate as that of *D. reticulatus* and the dorso-lateral prolongation is subterminal; the goblets are 536 in number, rather evenly distributed; the circles of the middle layer are visible. Greatly enlarged. Original. U. S. P. H. & M. H. S. 9920.

O. electus ♂

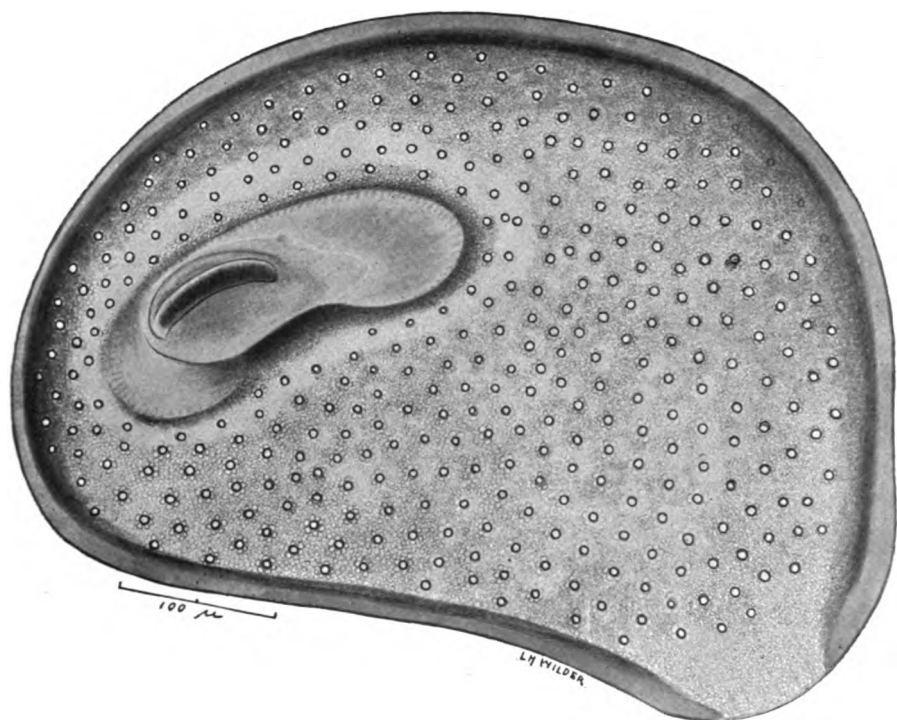


FIG. 4.—Deep focus of plate, showing the relatively small, elongate chamber under the aperture and the numerous circles (goblet stems; of the inner layer. Greatly enlarged. Original. U. S. P. H. & M. H. S. 9920.

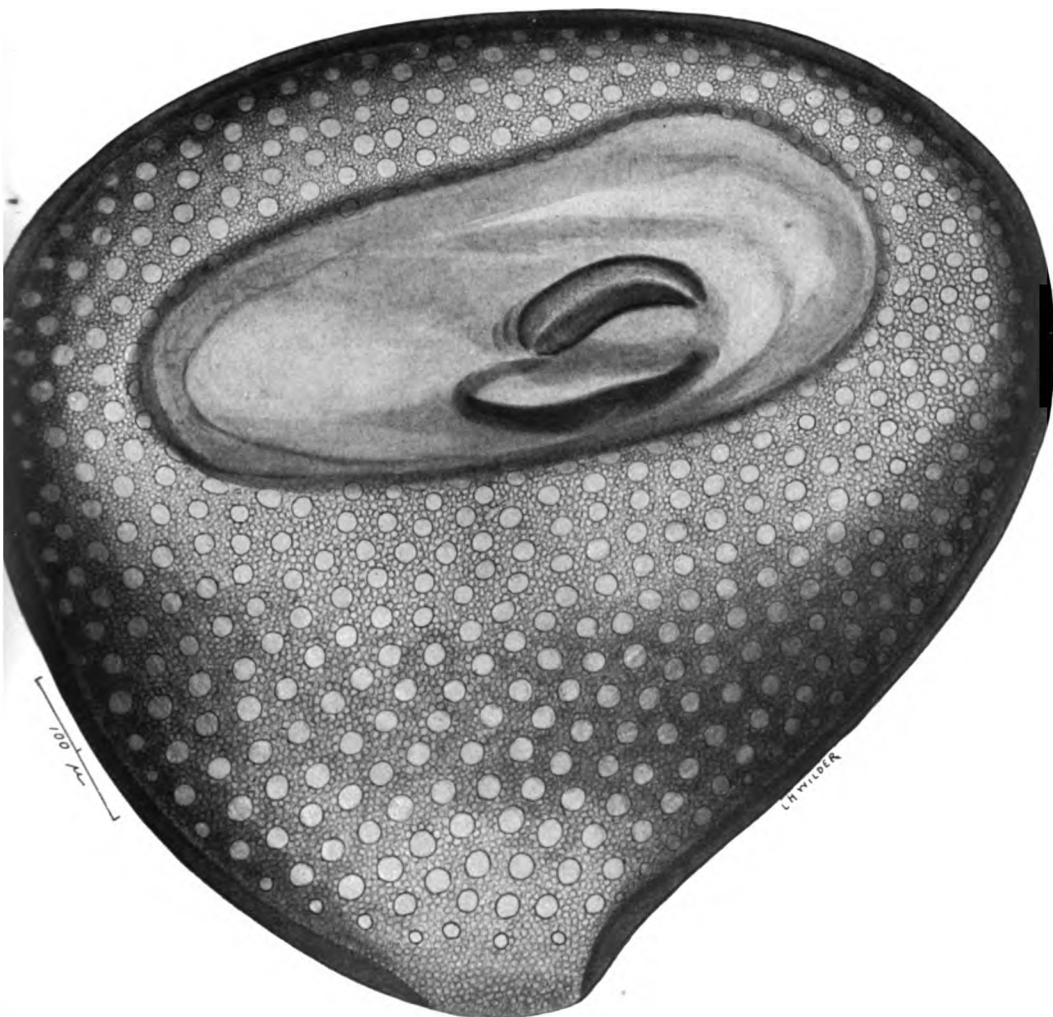
D. electus ♂

FIG. 5.—Female stigmal plate of *D. electus* seu *variabilis*. Notice that this plate is much broader than that of the male; 455 μ goblets are present, and the chamber is much larger; the dorso-lateral prolongation is just caudad of the equator. Greatly enlarged. Original. B. A. I. 3150.

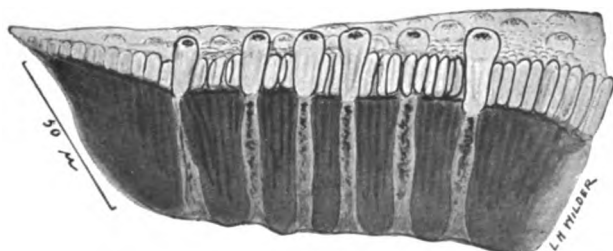


FIG. 6.—Transverse section of a portion of stigmal plate of *D. electus* seu *variabilis*. Notice the three layers: in the upper layer are seen the goblets; in the middle layer are seen the goblets and the chitinous supporting cells; in the thick inner layer are seen the stems of the goblets. Greatly enlarged. Original.

D. electus ♀

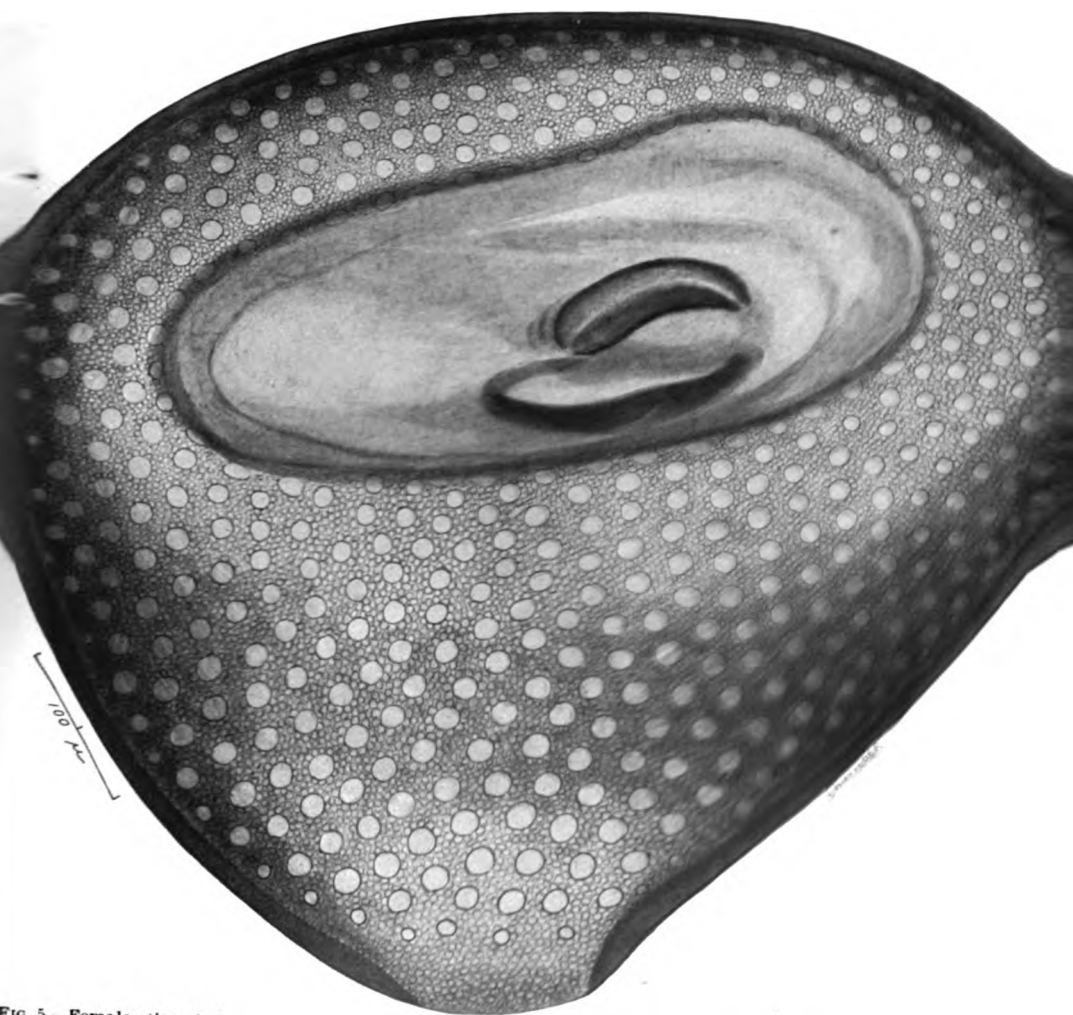


FIG. 5.—Female stigmatal plate of *D. electus* sensu *variabilis*. Notice that this plate is much larger than that of *D. electus*. Notice the three layers; in the upper layer are seen the goblets, in the middle layer are seen the stems of the goblets, and in the lower layer are seen the supporting cells. The chamber is much larger; the dorso-lateral prolongation is much larger. Greatly enlarged. Original. B. A. I. 3150.

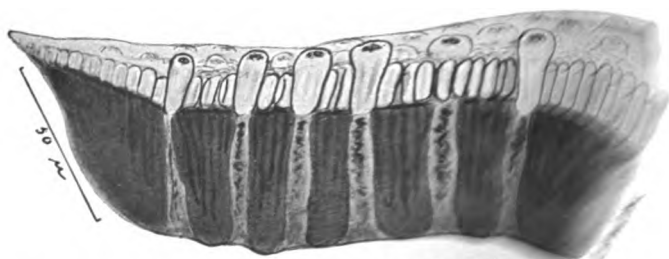


FIG. 6.—Transverse section of a portion of stigmatal plate of *D. electus*. Notice the three layers; in the upper layer are seen the goblets, in the middle layer are seen the stems of the goblets, and in the lower layer are seen the supporting cells. The chamber is much larger; the dorso-lateral prolongation is much larger. Greatly enlarged. Original.

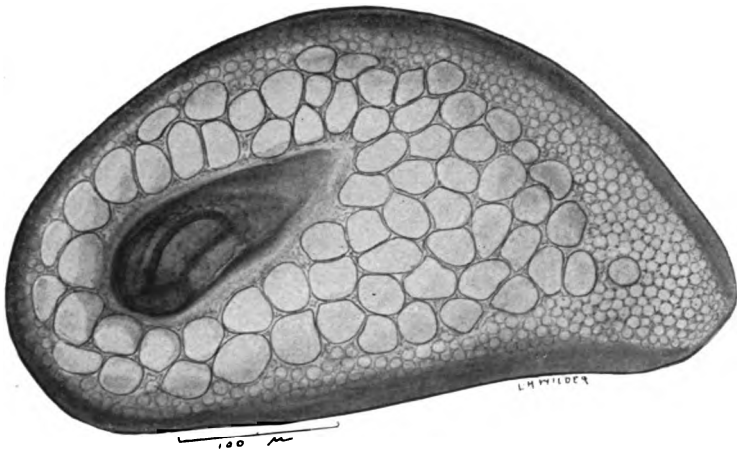
D. occidentalis ♂

FIG. 7.—Stigmal plate of male *D. occidentalis*. Notice the elongate form, the position of the aperture, and the terminal dorso-lateral prolongation; the goblets (67 in number) occupy a considerable portion of the plate, but are absent from the margin and from the terminal portion of the prolongation; in these places the circles of the middle layer appear. Greatly enlarged. Original. Marx 119, type.

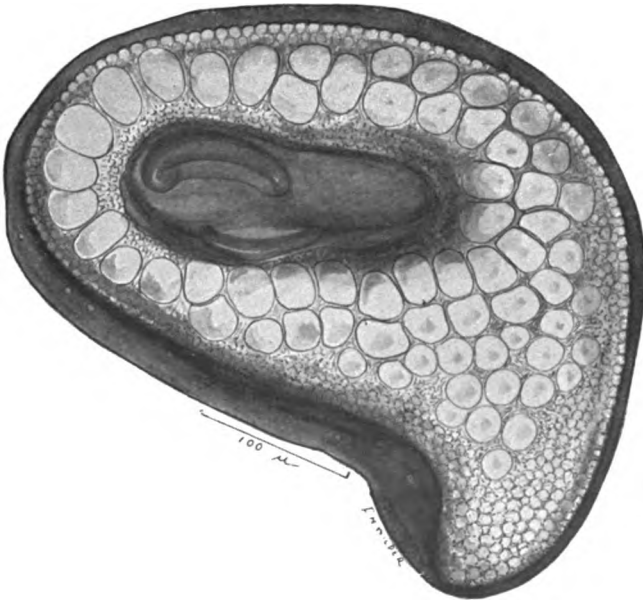
D. occidentalis ♀

FIG. 8.—Stigmal plate of female *D. occidentalis* with 64 goblets. Greatly enlarged. Original.

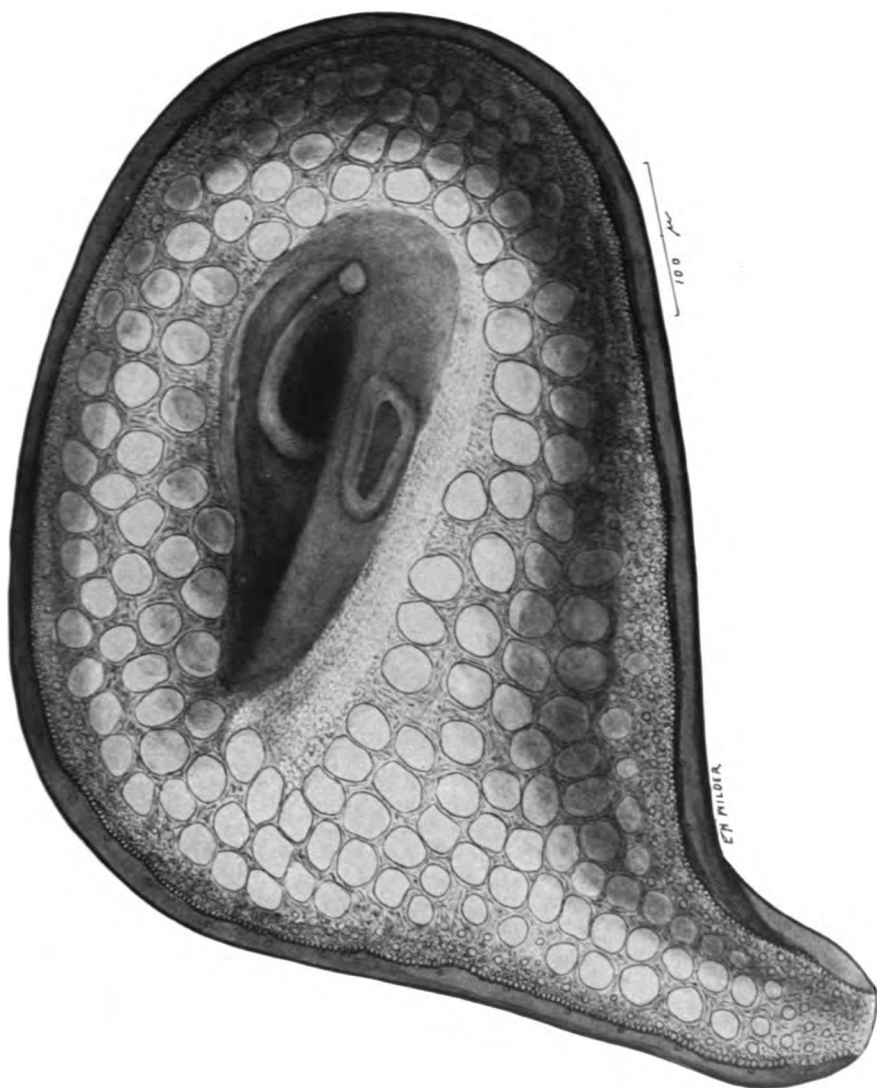


FIG. 9.—Stigmatal plate of male *D. andersoni*. Notice the relatively large aperture and chamber and the prominent dorso-lateral prolongation which forms a right angle at the caudal margin; the goblets are numerous (157) and evenly distributed, but are absent from the margin; the middle layer is visible. Greatly enlarged. Original. U. S. P. II. & SI. H. S. 9466.

D. andersoni ♀

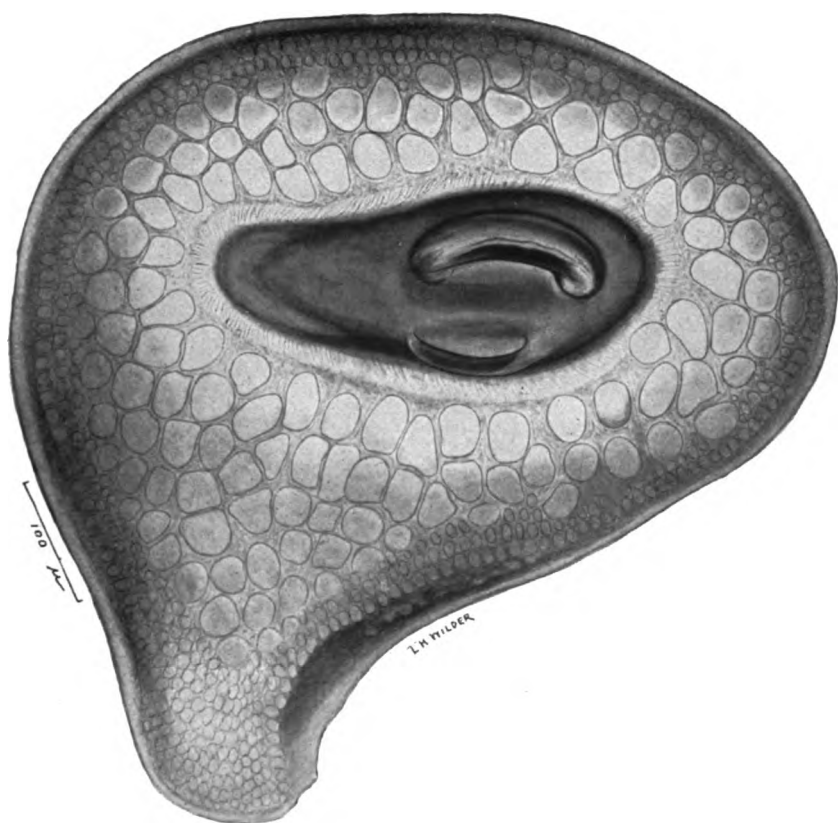


FIG. 10.—Stigmatal plate of female *D. andersoni*. Notice the acute angle formed by the dorso-lateral prolongation; the anterior margin of the prolongation is broader than the caudal margin; 120 goblets are present. Greatly enlarged. Original. U. S. P. H. & M. H. S. 9503.

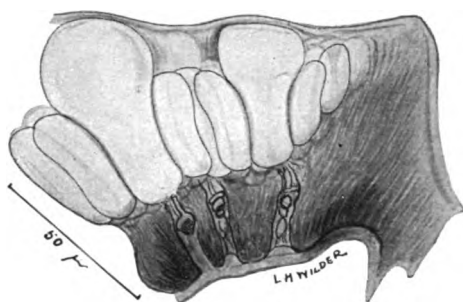


FIG. 11.—Section of a stigmal plate of *D. andersoni*. Greatly enlarged. Original.

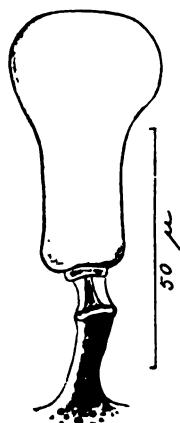


FIG. 12.—An isolated goblet of same. Greatly enlarged. Original.



FIG. 13.—An isolated hair near margin of stigmal plate. Greatly enlarged. Original.

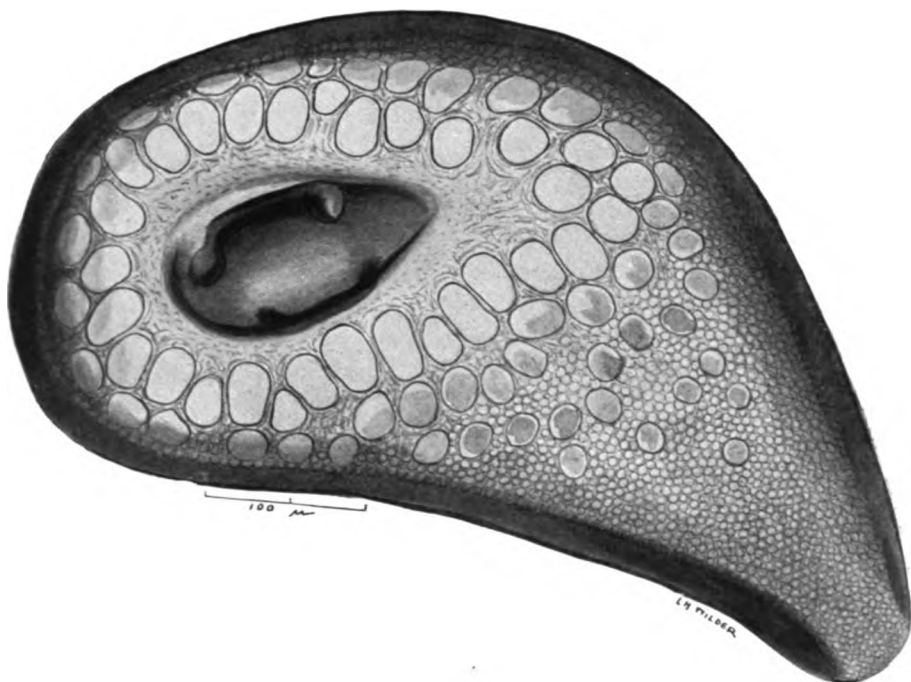
D. venustus ♂

FIG. 14.—Stigmal plate of male *D. venustus*. Notice the broad aperture, the prominent terminal prolongation, and the scattered goblets; the middle layer also is visible. Greatly enlarged. Original. Marx 122.

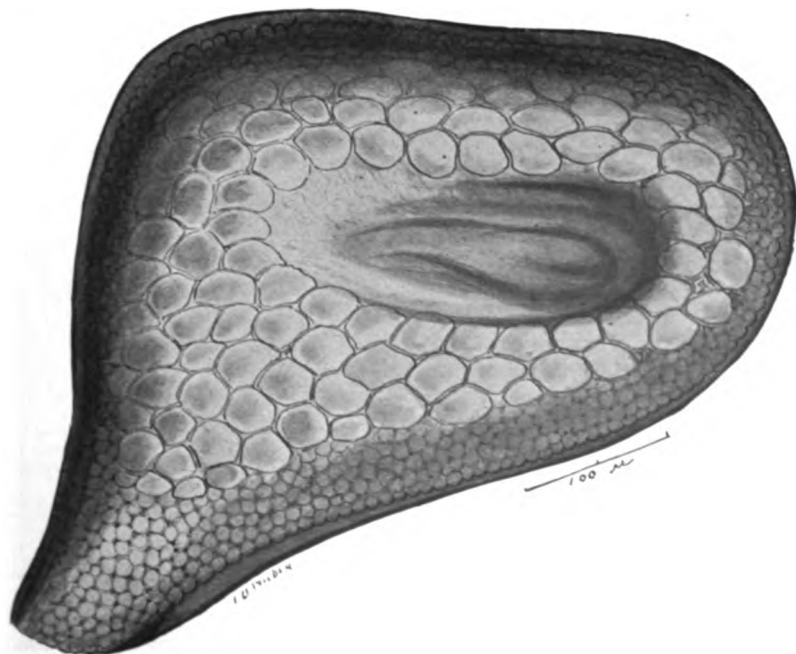
D. venustus ♀

FIG. 15.—Stigmal plate of female *D. venustus*. As this was drawn from an unmounted specimen, it may not be absolutely so exact a representation as is the plate of the male. Greatly enlarged. Original. Marx 122.

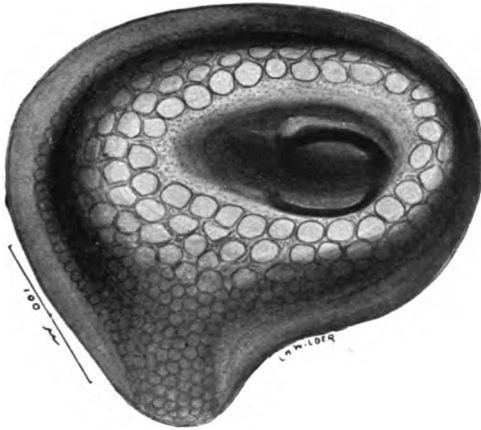
D. parumapertus ♀

FIG. 16.—Stigmal plate of female *D. parumapertus*. Notice the convexity of the plate, the prolongation which forms an acute angle at the caudal margin of the plate, the concentration of the goblets around the aperture, and note also the unusually large chamber. Greatly enlarged. Original. Marx 143.

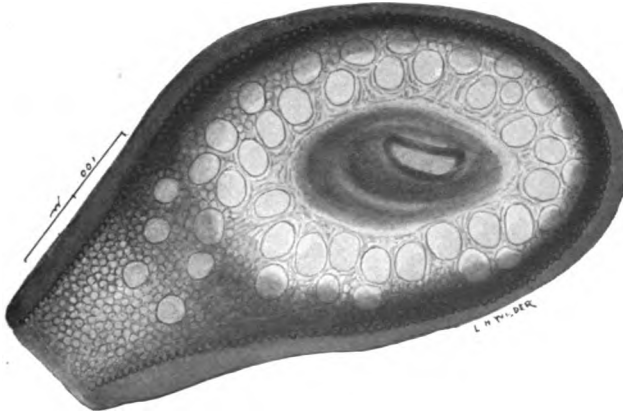
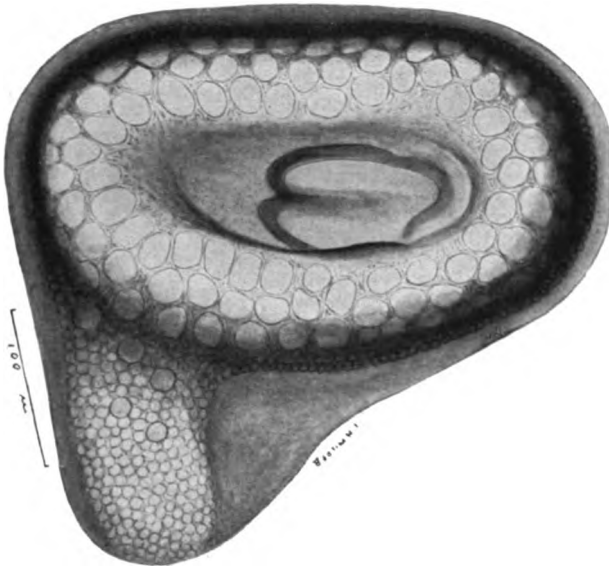
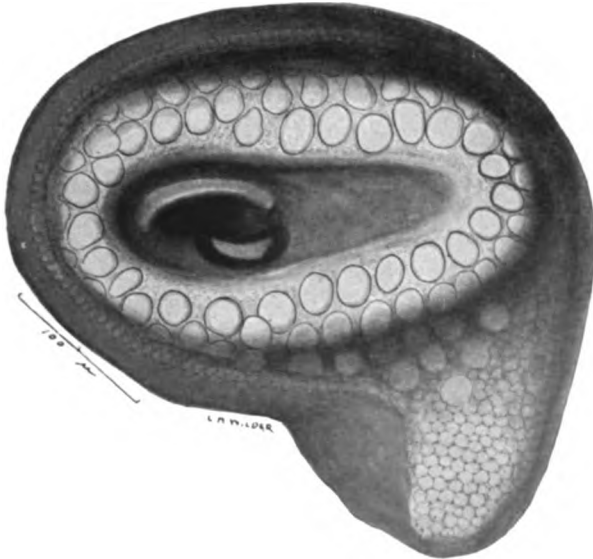
D. parumapertus marginatus ♂

FIG. 17.—Stigmal plate of male *D. parumapertus marginatus*. Notice the prominent prolongation [broken at end], the unusually large chamber, the convexity of the plate, and the arrangement of the goblets. Greatly enlarged. Original. Marx 137.

D. parumapertus marginatus ♀



D. parumapertus marginatus ♀



FIGS. 18-19.—Plates of two female *D. parumapertus marginatus*. Notice the acute angle formed by the prolongation, the enormous aperture and chamber, the circular goblets, the convexity of the plate, and the broad anterior margin of the prolongation. Greatly enlarged. Original. Marx 137 and B.A.I.3415.

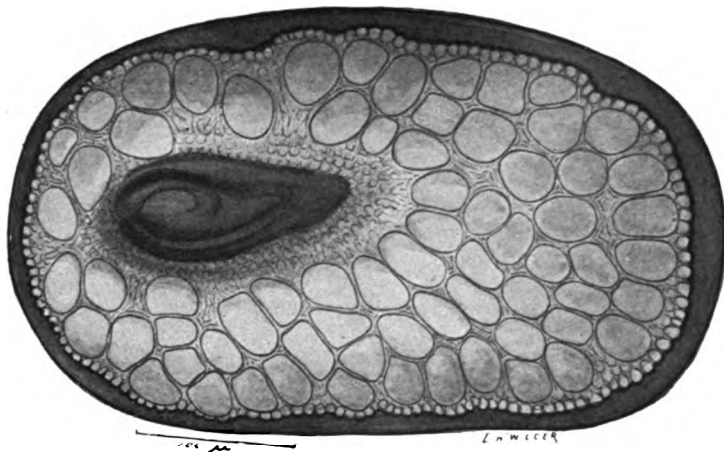
D. nigrolineatus ♂

FIG. 20.—Stigmatal plate of male tick determined by Banks as *D. nigrolineatus*. Notice the preequatorial position of the aperture, the arrangement of the goblets, and the absence of a dorso-lateral prolongation. Enlarged. Original. U. S. P. H. & M. H. S. 10592.

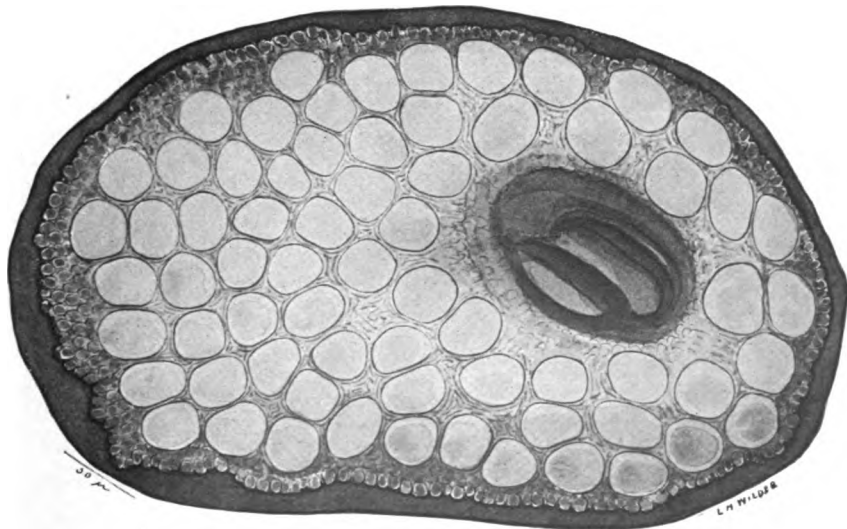
D. nigrolineatus ♂

FIG. 21.—Stigmatal plate of male *D. nigrolineatus* from Oklahoma. Enlarged. Original. B. A. I. 4363.

D. nigrolineatus ♂

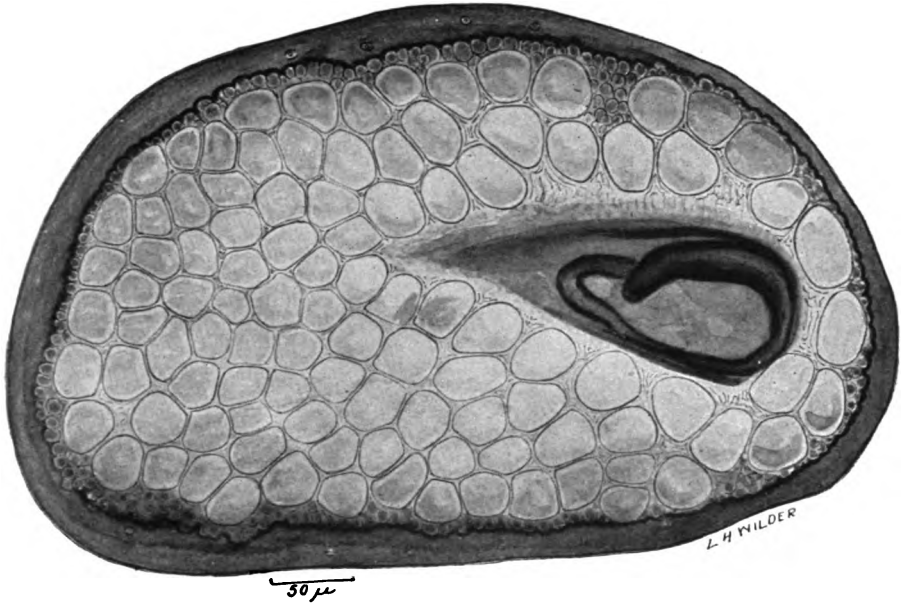


FIG. 22.—Stigmatal plate of male *D. nigrolineatus* from New York. Enlarged. Original.
U. S. P. H. & M. H. S. 9992.

D. nigrolineatus ♀

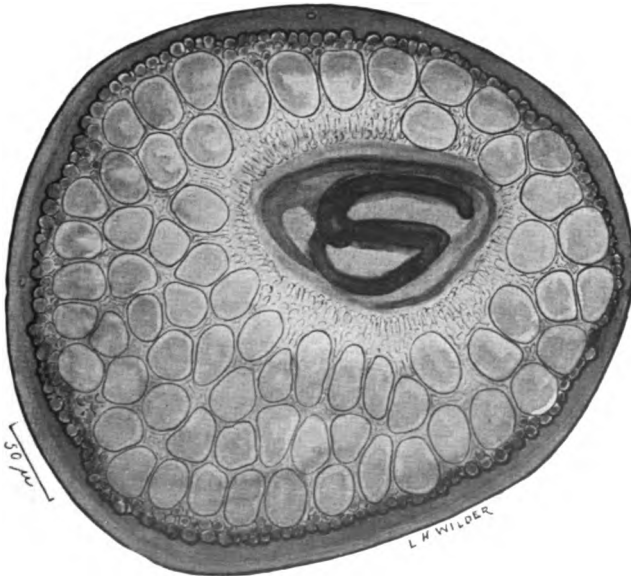


FIG. 23.—Stigmatal plate of female *D. nigrolineatus* from New York. Enlarged. Original.
U. S. P. H. & M. H. S. 9992.

D. nigrolineatus ♀

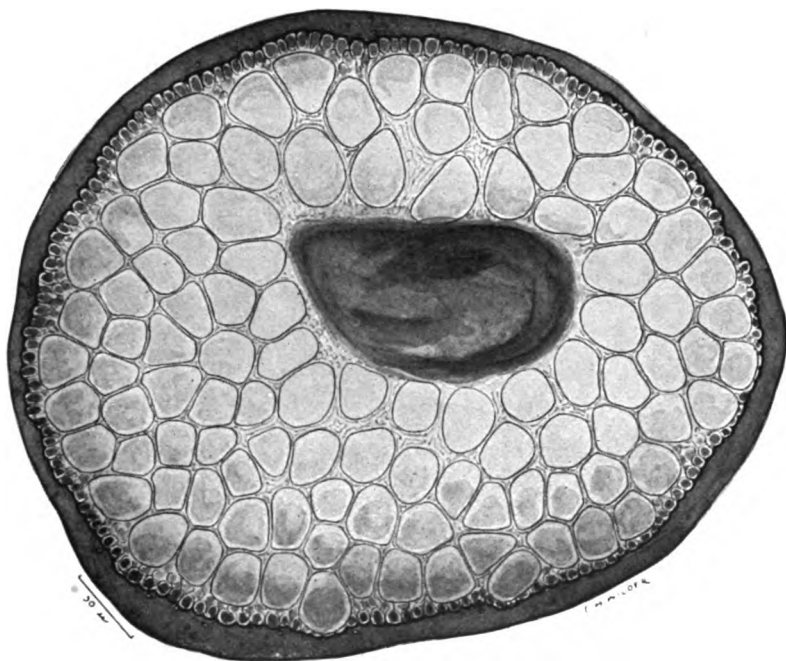


FIG. 24.—Stigmatal plate of female *D. nigrolineatus* from Tennessee. Enlarged. Original.
B. A. I. 4288.

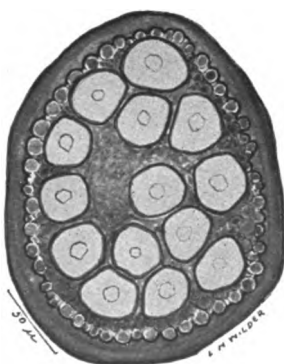


FIG. 25.—Stigmatal plate of nymph *D. nigrolineatus* from Oklahoma. Enlarged. Original.
B. A. I. 4363.

D. salmoni ♀

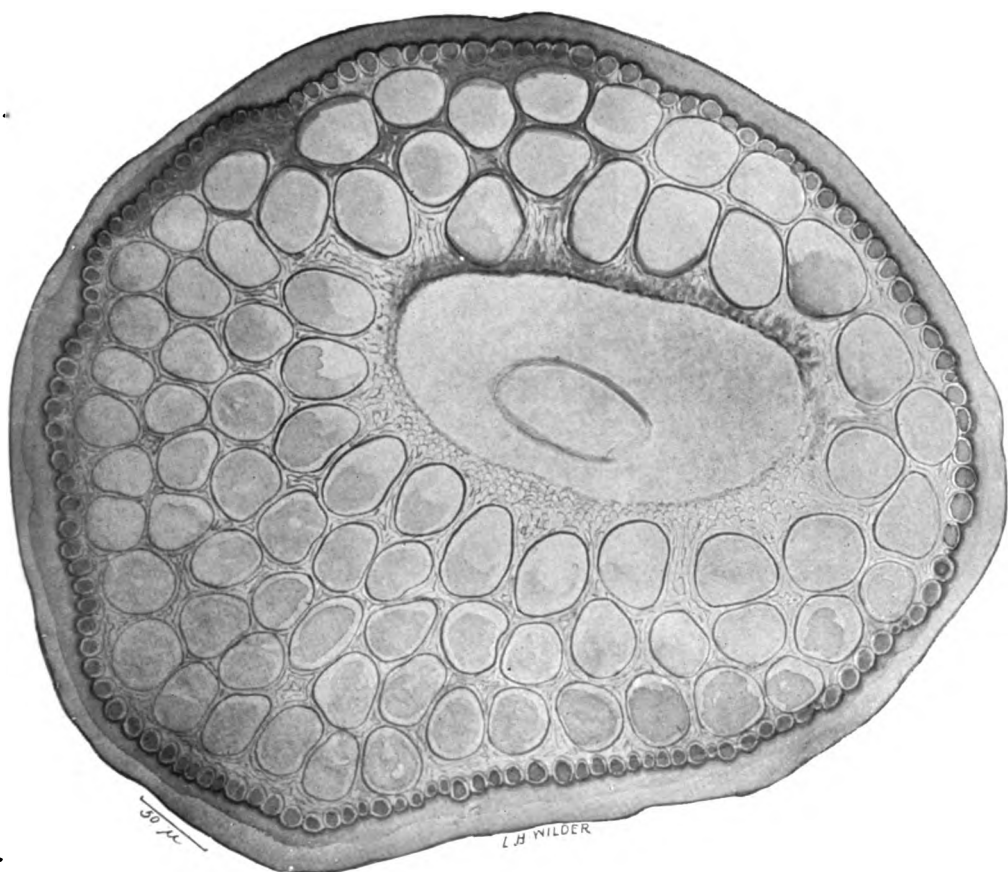


FIG. 26.—Stigmatal plate of female *D. salmoni* (type) from *Bos taurus*, Oklahoma. Enlarged. Original. B. A. I. 3179.

D. salmon ♀

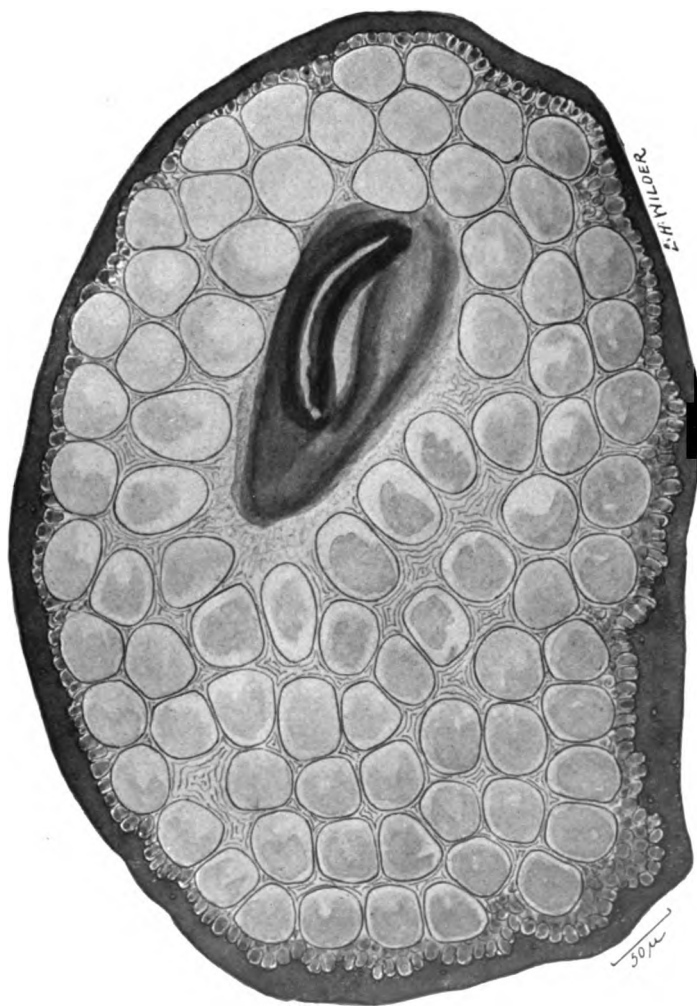
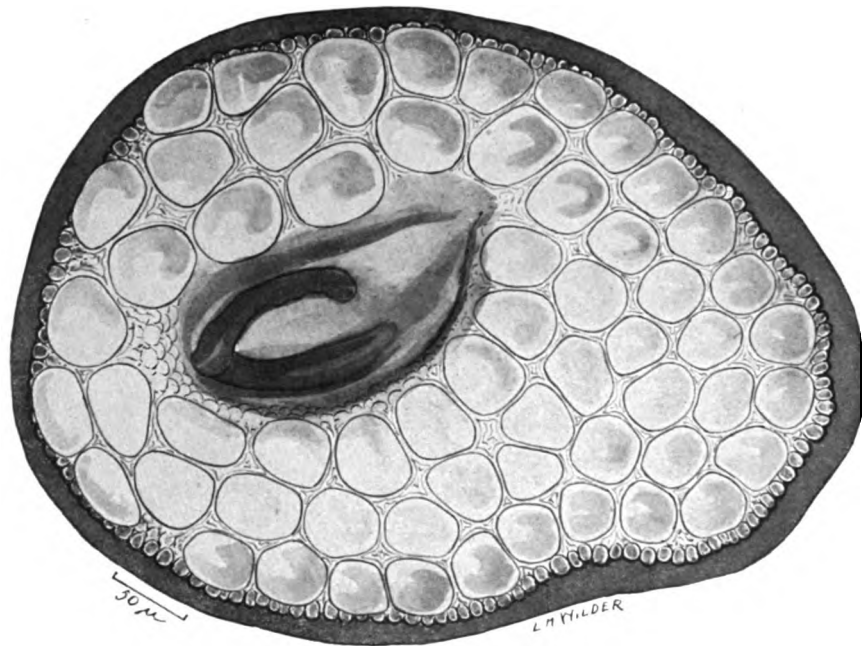
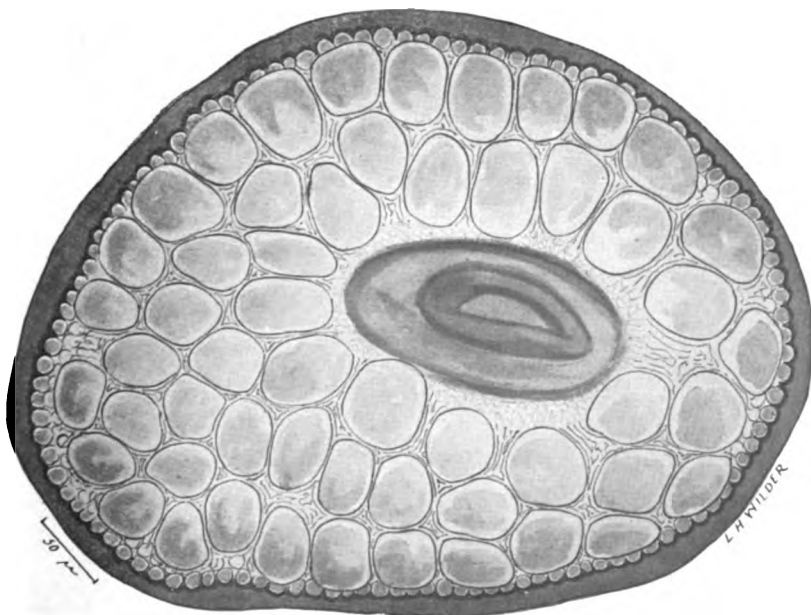


FIG. 27.—Stigmatal plate of female *D. salmon*. Enlarged. Original. B. A. I. 2998.

D. salmoni ♂



D. salmoni ♂



FIGS. 28-29.—A pair of stigmal plates of male *D. salmoni* from Montana. Enlarged. Original. U. S. P. H. & M. H. S. 9724.

D. salmonis ♀

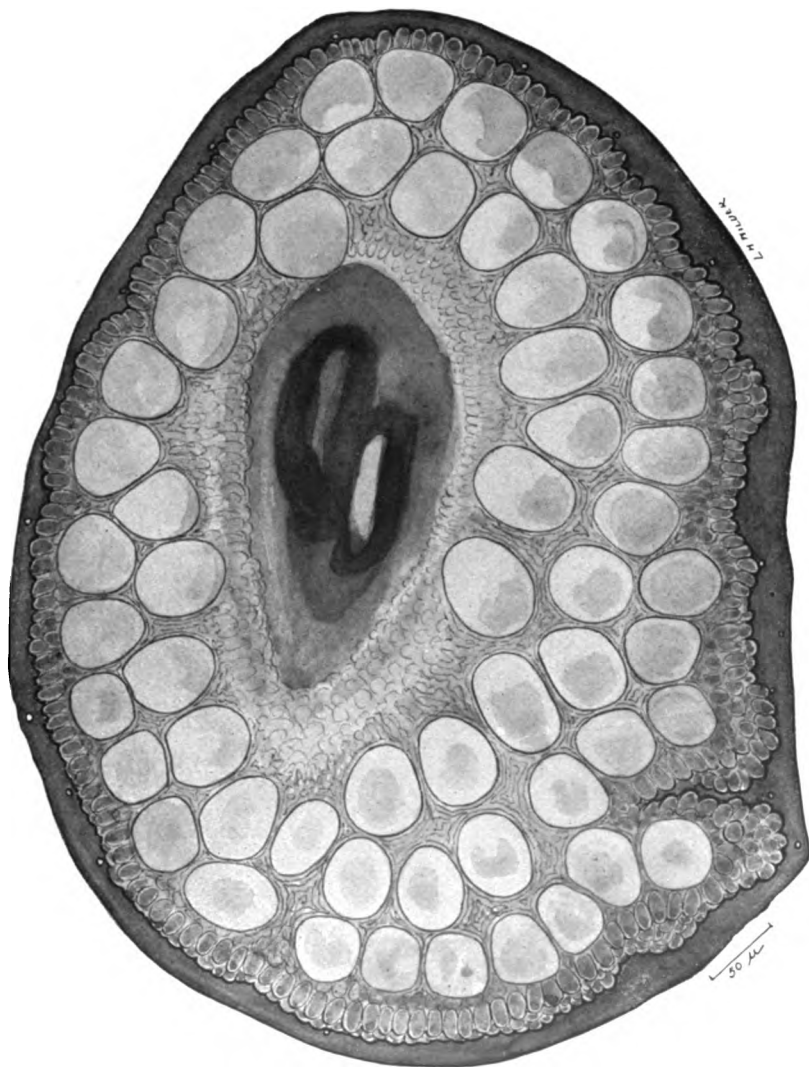


FIG. 30-31.—A pair of stigmatal plates of female *D. salmonis* from Montana. Enlarged. Original. U. S. P. H. & M. H. S. 9724.

D. salmonis ♀

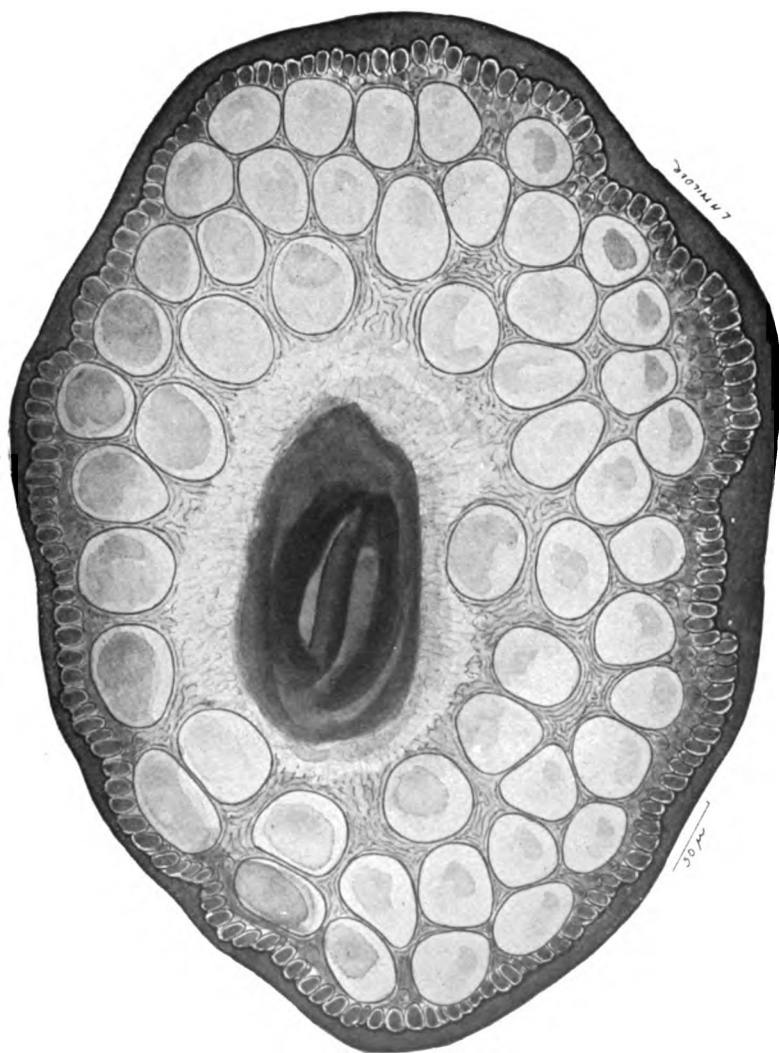


FIG. 30-31.—A pair of stigmatal plates of female *D. salmonis* from Montana. Enlarged. Original, U. S. P. H. & M. H. S. 9724.



D. salmoni ♀

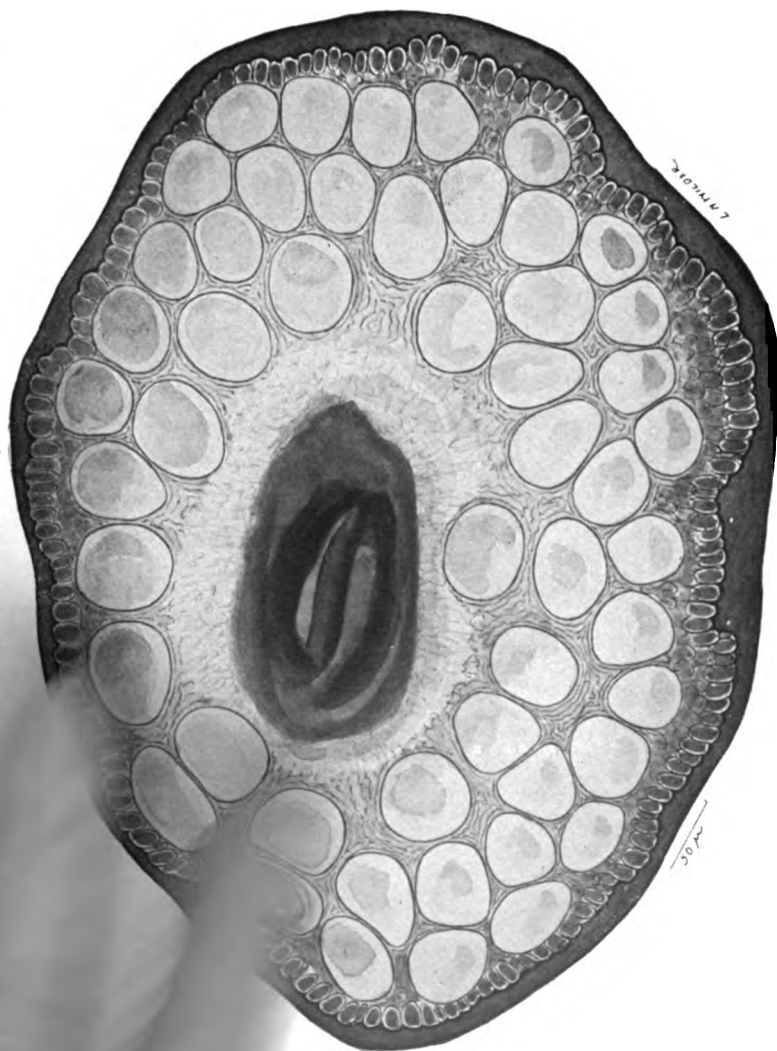


FIG. 30-31.—A pair of stigmal plates of female *D. salmoni* from Montana. Enlarged. Original. U. S. P. H. & M. H. S. 9724.

D. salmonis ♀

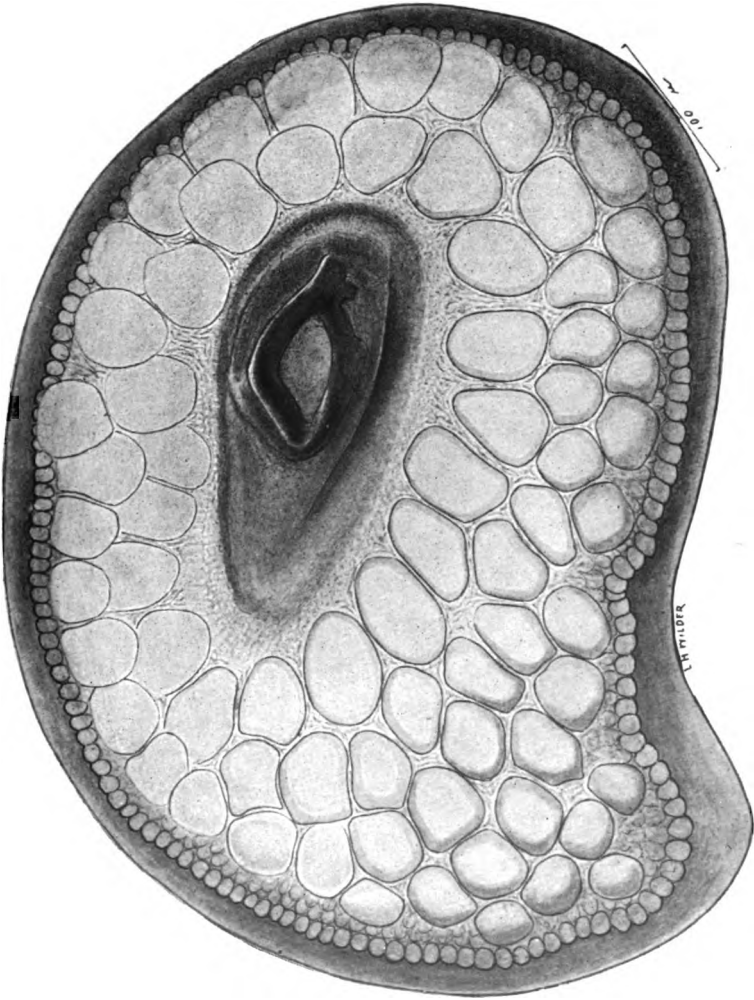


FIG. 32.—Stigmatal plate of female *D. salmonis* from Tennessee. Enlarged. Original. B. A. I. 3206.

O. salmon ♀

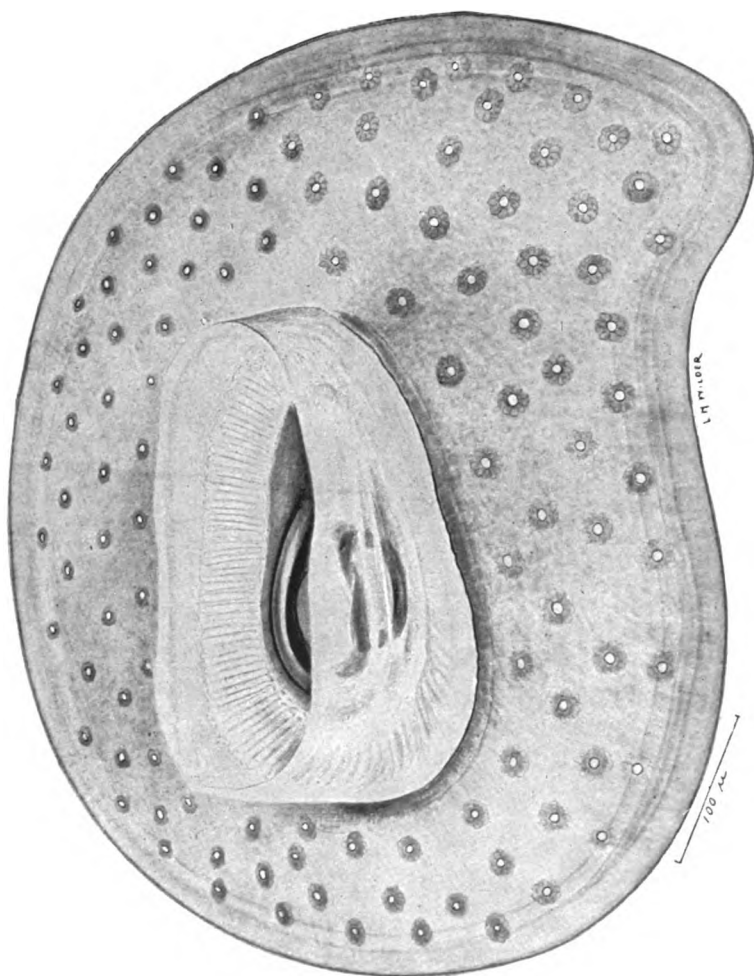


FIG. 33.—Obverse view of plate shown in figure 32.

FIG. 34a.—Section of stigmal plate of *D. salmosi* from Tennessee. Greatly enlarged. Original. B. A. I. 3206.

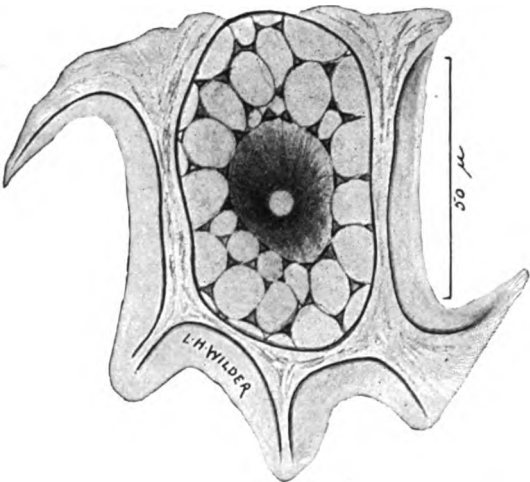
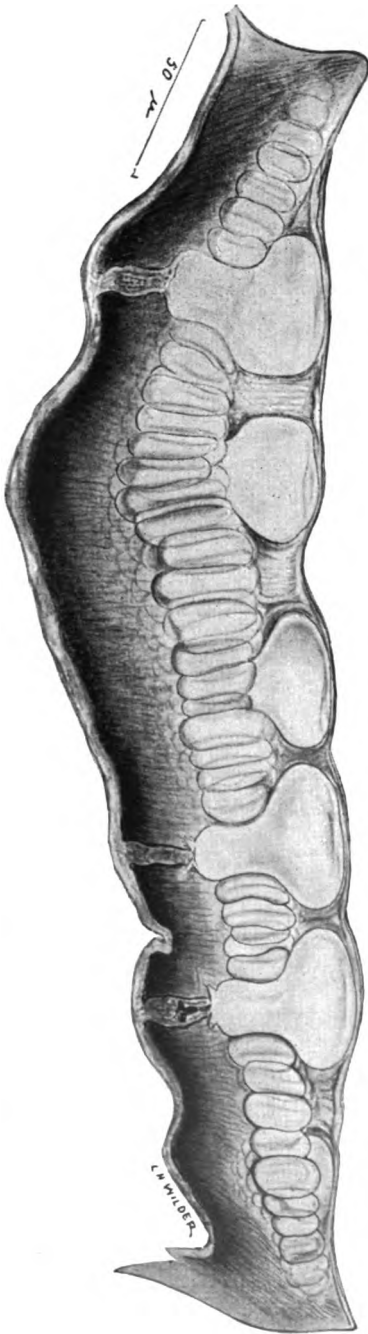


FIG. 34b.—View of a goblet of *D. salmosi*, at deep focus to show the supporting cells and the stem of the goblet. Greatly enlarged. Original. B. A. I. 3206.

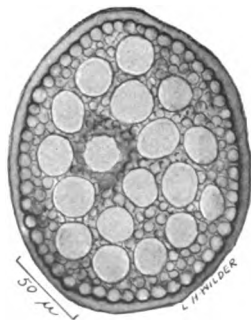


FIG. 35.—Stigmal plate of nymph of *D. salmosi*. Enlarged. Original. B. A. I. 3206.

D. salmon. ♂

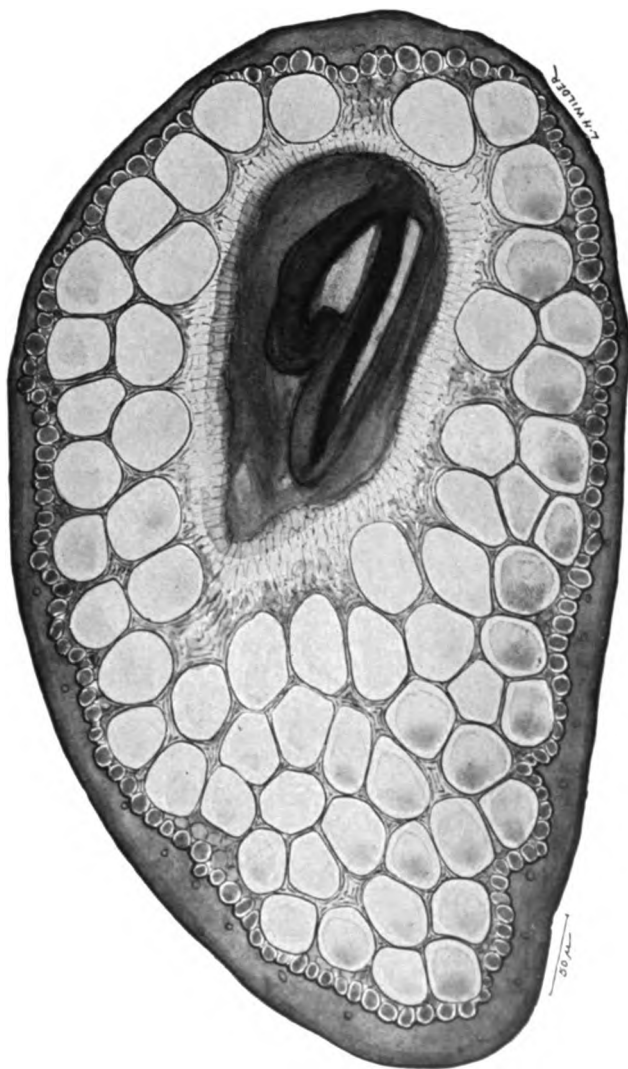


FIG. 36.—Stigmal plate of male *D. salmoni*. Enlarged. Original. U. S. P. H. & M. H. S. 10008.

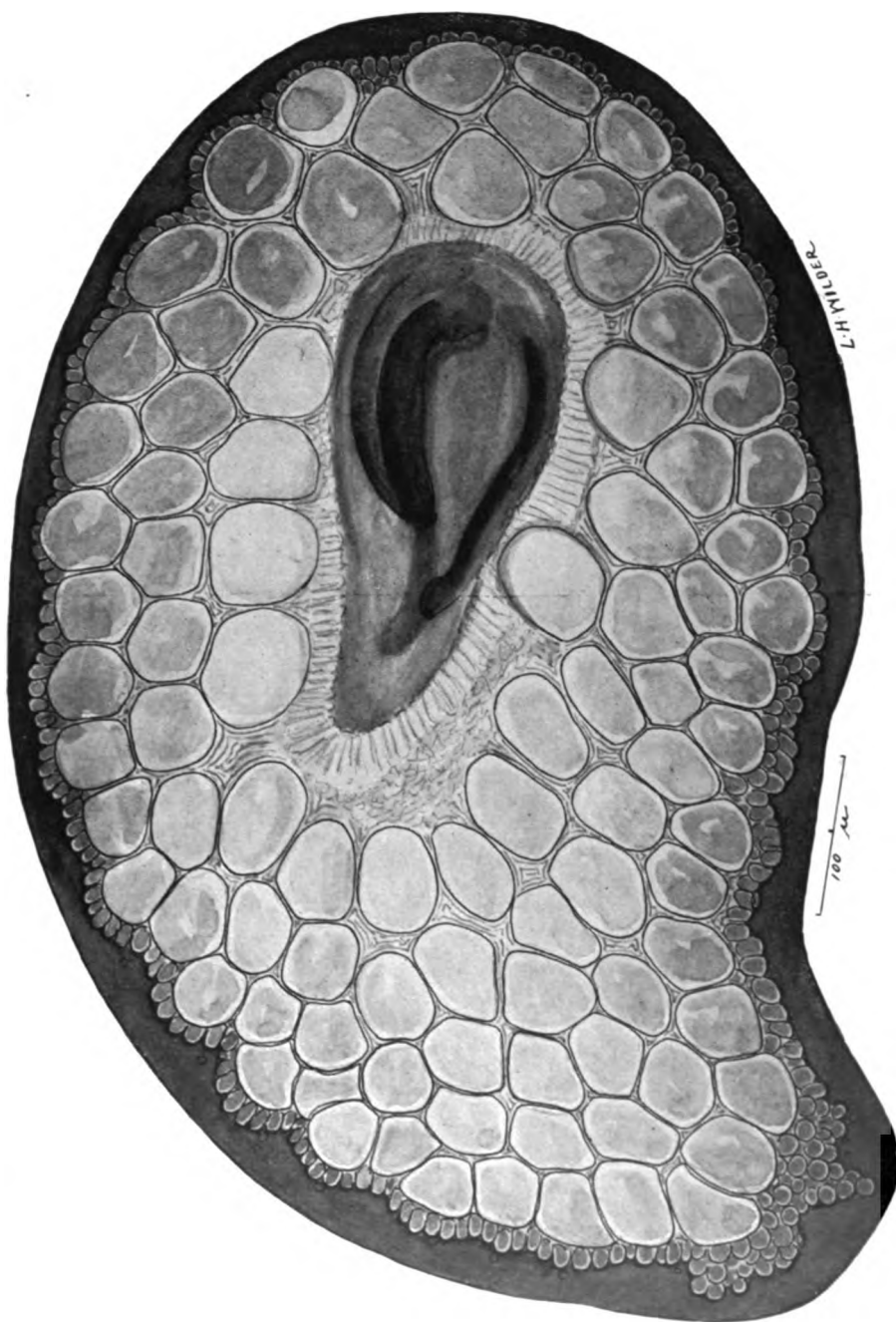


FIG. 37.—Stigmatal plate of male *D. albigatus* variegatus. Notice the prolongation, and the large goblets, Enlarged, Original. B. A. I. 3172.

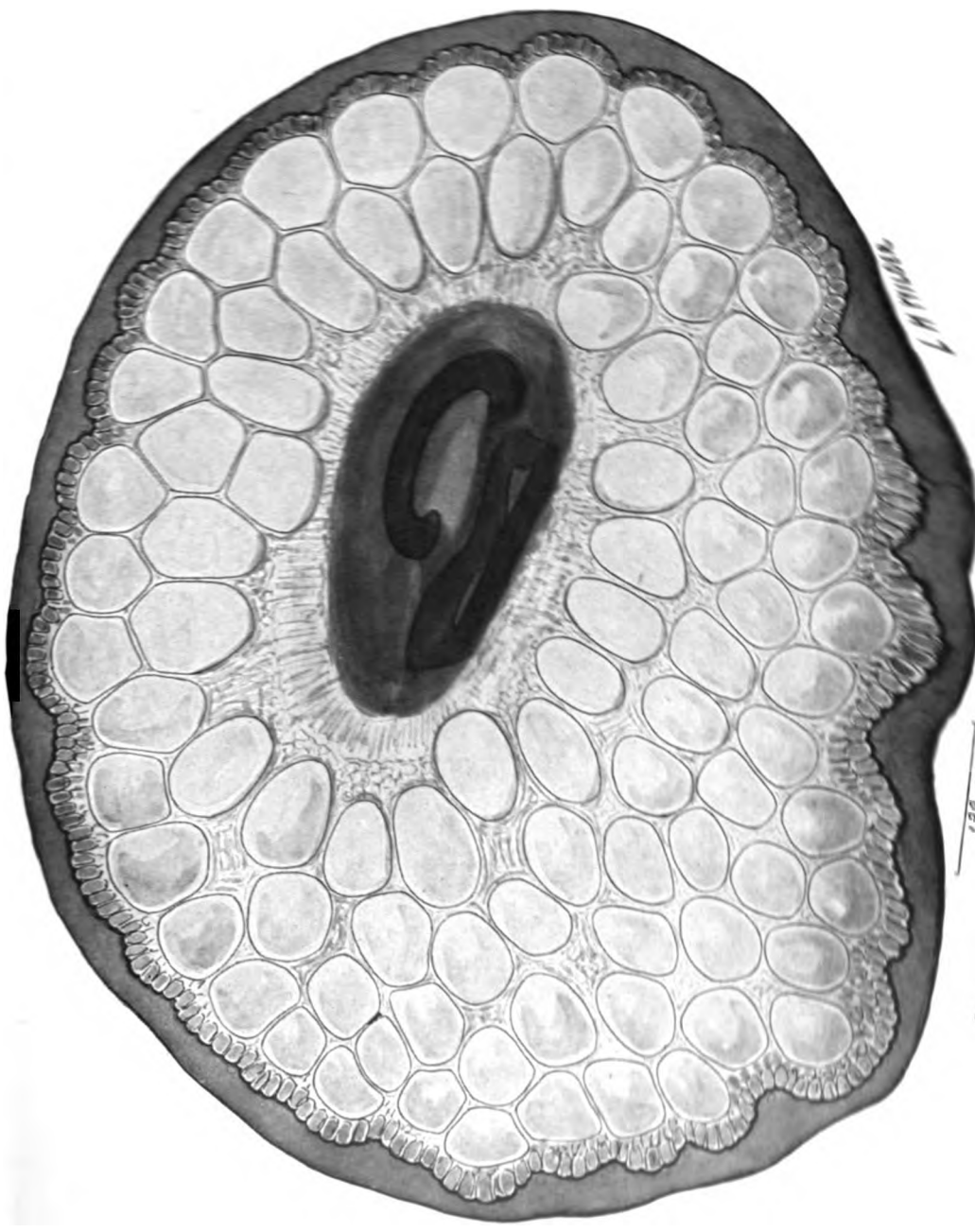


Fig. 1

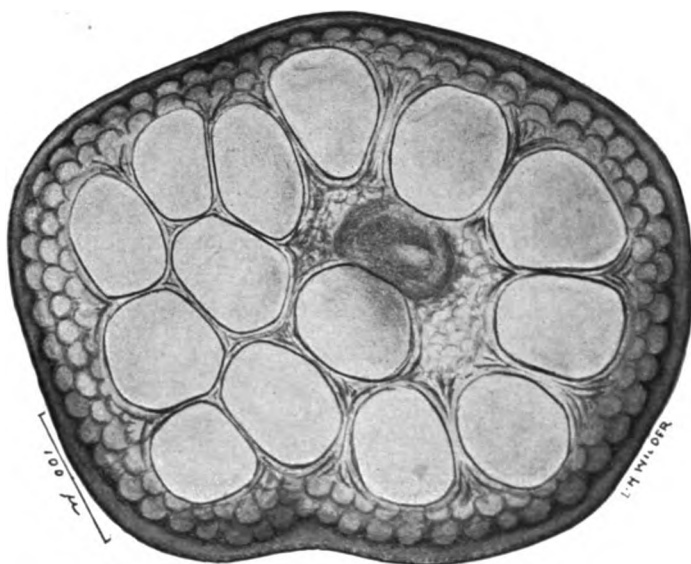


FIG. 39.—Stigmatal plate of nymph *D. albipictus* seu *variegatus*. Enlarged. Original. B. A. I. 3172.

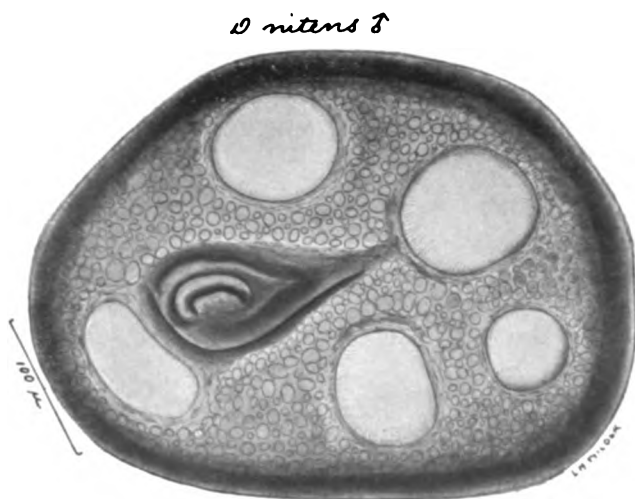


FIG. 40.—Stigmatal plate of male *D. nitens* from Texas. Enlarged. Original. U. S. P. II. & M. II. S. 9908.

D. nitens ♂

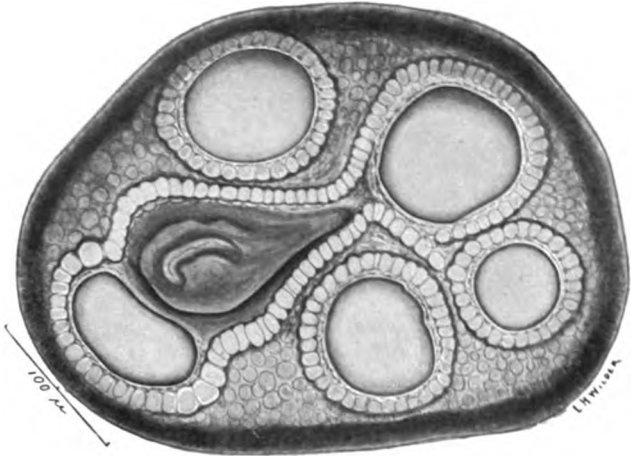


FIG. 41.—The same at lower focus.

D. nitens ♀

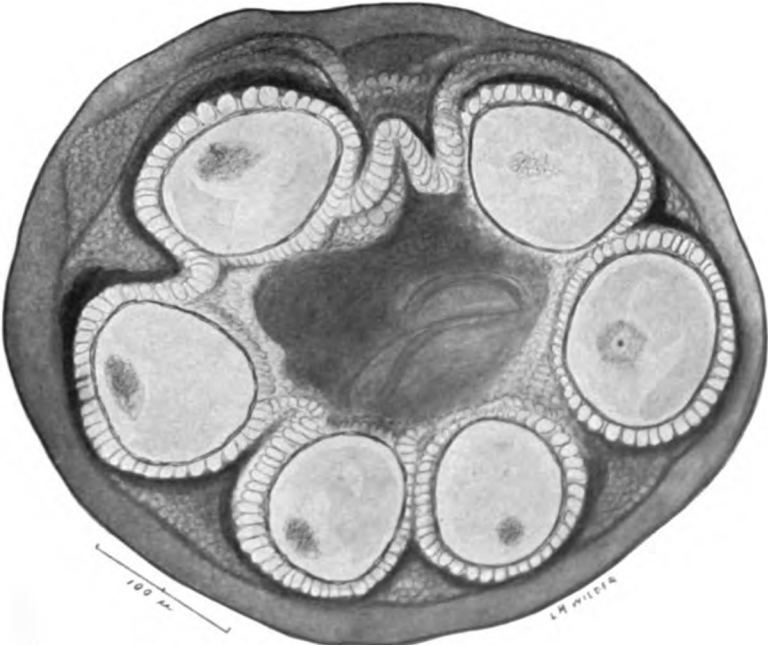


FIG. 42.—Stigmatal plate of female *D. nitens* from Jamaica, Enlarged. Original. U. S. P. H. & M. H. 8 9991.

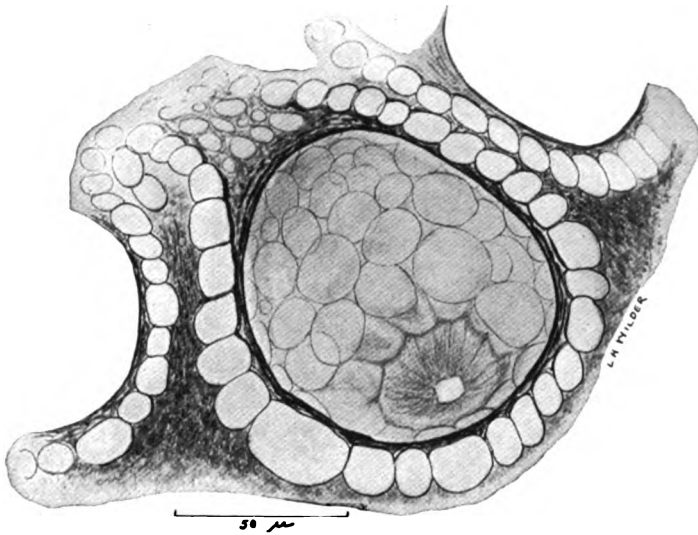


FIG. 43.—A goblet very greatly enlarged, showing also the supporting cells and the stem of the goblet. Greatly enlarged. Original. U. S. P. H. & M. H. S. 9908

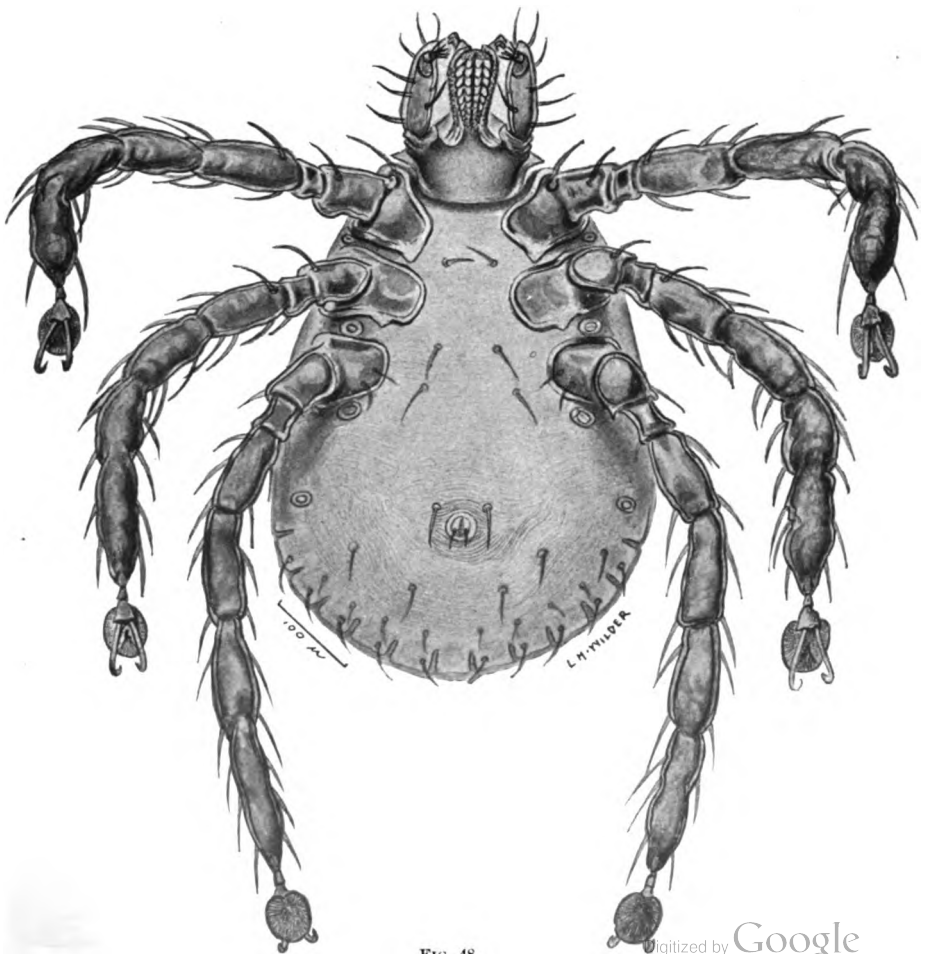


FIG. 48.



FIG. 44. VENTRAL VIEW.

L. H. Wilder



FIG. 45. DORSAL VIEW.

DERMACENTOR ANDERSONI.





FIG. 46. DORSAL VIEW.

L. H. Wilder



FIG. 47. VENTRAL VIEW

DERMACENTOR ANDERSONI.

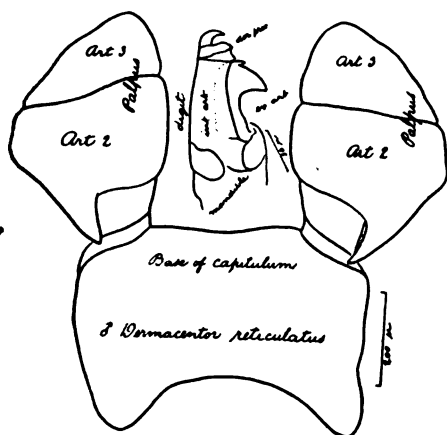


Fig. 49.

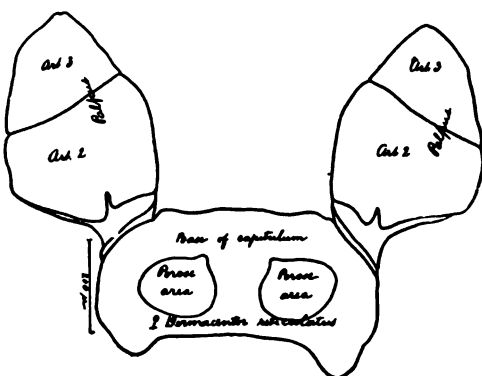


Fig. 50.

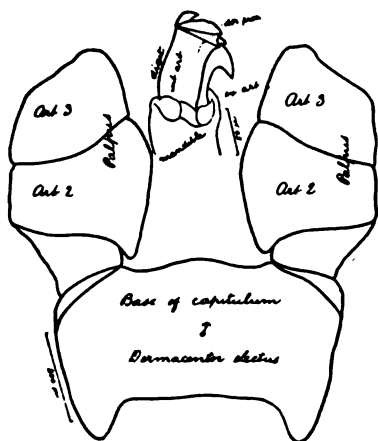


Fig. 51.

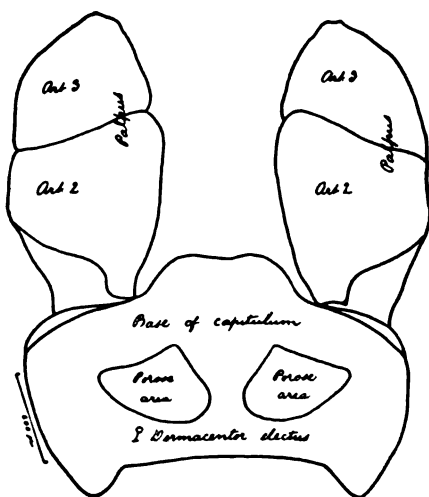


Fig. 52.

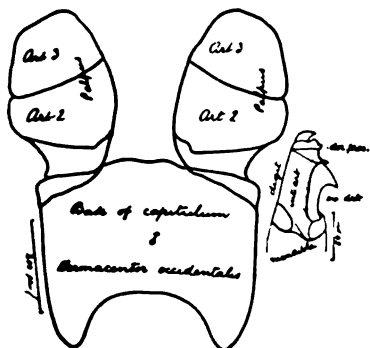


Fig. 53.

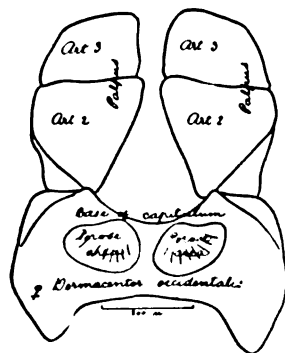


Fig. 54.

L. H. Wüder, Del.

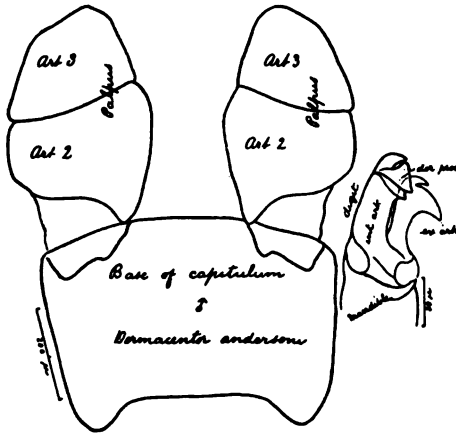


Fig. 55.

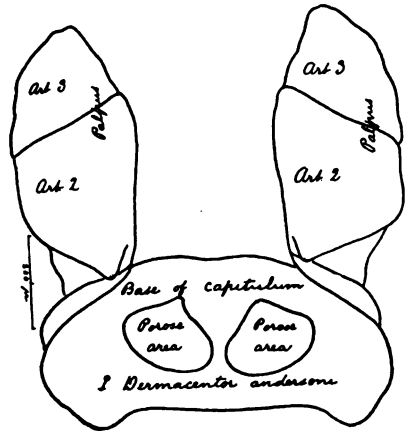


Fig. 56.

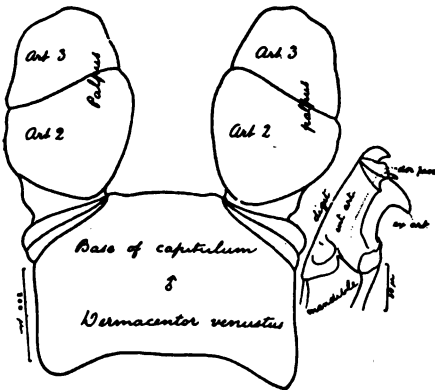


Fig. 57.

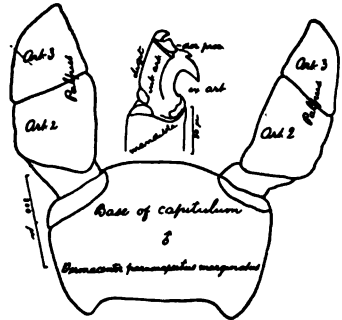


Fig. 58.

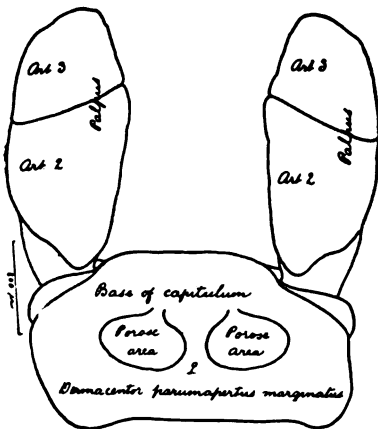


Fig. 59.

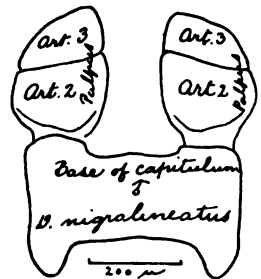


Fig. 60.

L. H. Wilder, Del.

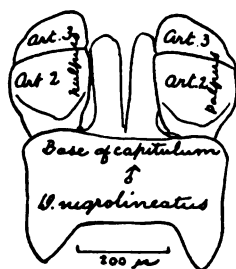


Fig. 61.

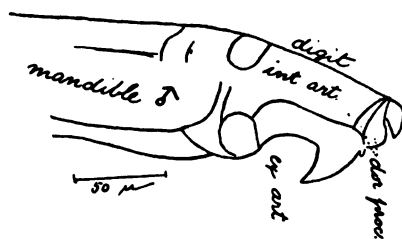


Fig. 62.

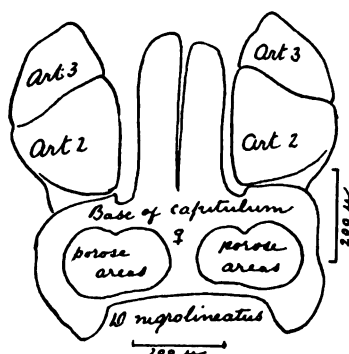


Fig. 63.

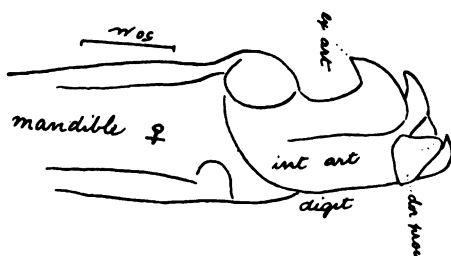


Fig. 64.

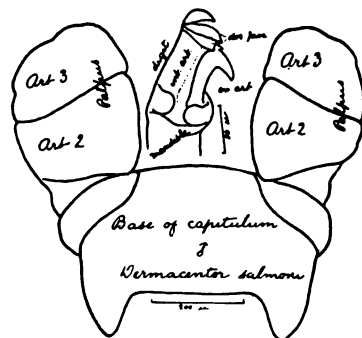


Fig. 65.

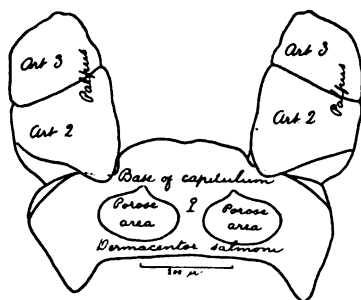


Fig. 66.

L. H. Wilder, Del.

Figs. 61-66.—OUTLINES OF CAPITULUM AND DIGIT OF DERMACENTOR.

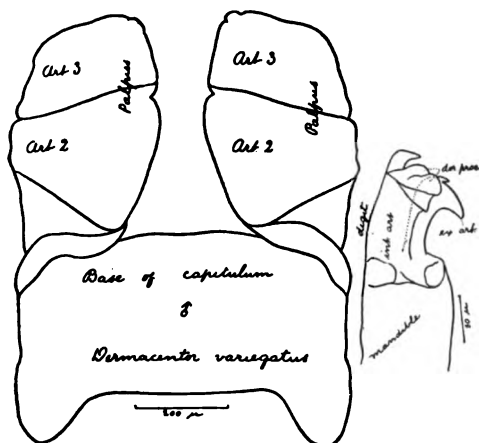


Fig. 67.

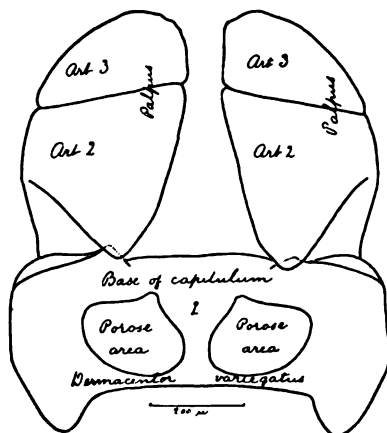


Fig. 68.

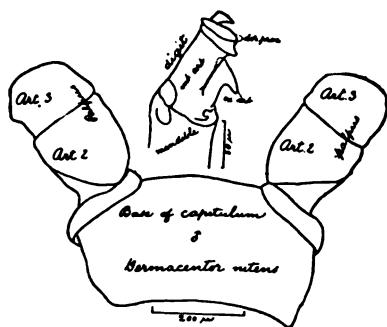


Fig. 69.

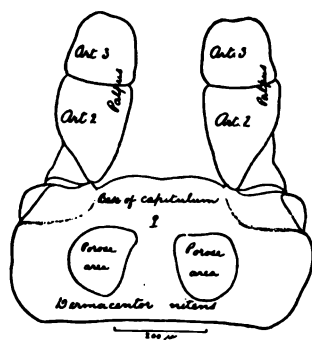


Fig. 70.

L. H. Wilder, Del.

Figs. 67-70.—OUTLINES OF CAPITULUM AND DIGIT OF DERMACENTOR.

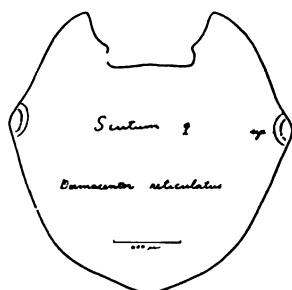


Fig. 71.

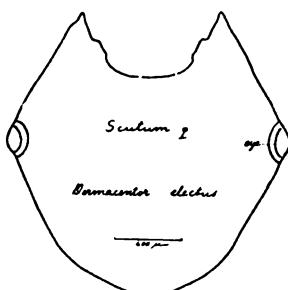


Fig. 72.



Fig. 73.

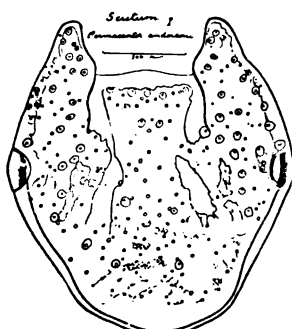


Fig. 74.

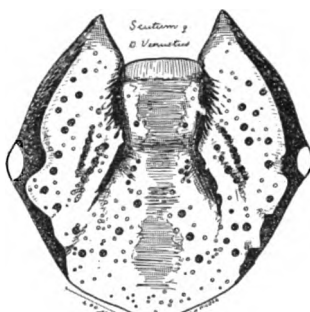


Fig. 75.

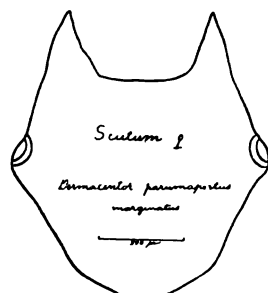


Fig. 76.

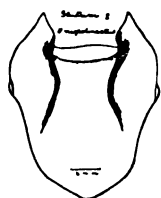


Fig. 77.



Fig. 78.

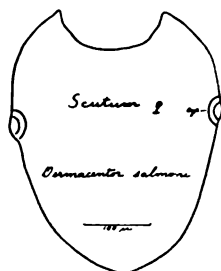


Fig. 79.

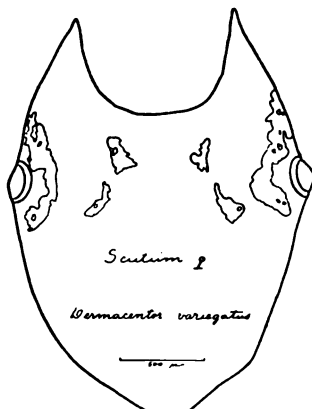


Fig. 80.

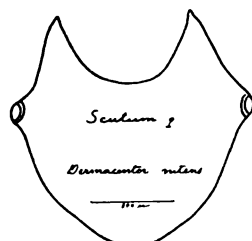


Fig. 81.

L. H. Wilder, Del.

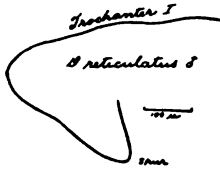


Fig. 82.



Fig. 83.



Fig. 84.



Fig. 85.



Fig. 86.

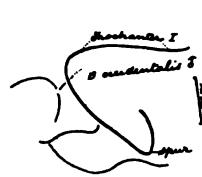


Fig. 87.

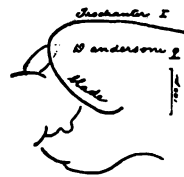


Fig. 88.



Fig. 89.

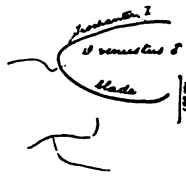


Fig. 90.

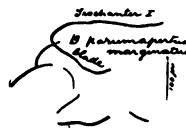


Fig. 91.



Fig. 92.

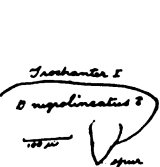


Fig. 93.

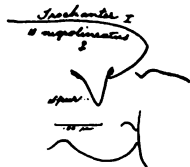


Fig. 94.



Fig. 95.

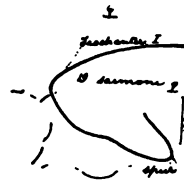


Fig. 96.

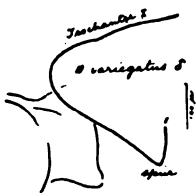


Fig. 97.

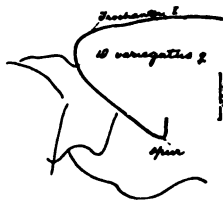


Fig. 98.



Fig. 99.



Fig. 100.

L. H. Wilder, Del.

Figs. 82-100.—DORSAL VIEW OF TERMINAL PORTION OF TROCHANTER I OF DERMACENTOR.

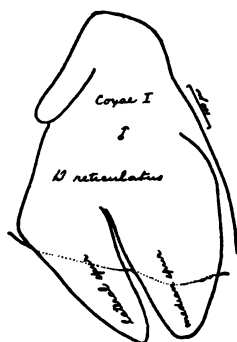


Fig. 101.

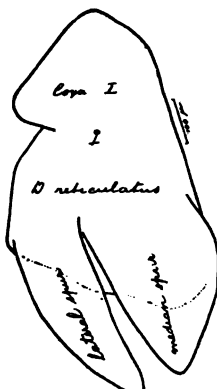


Fig. 102.

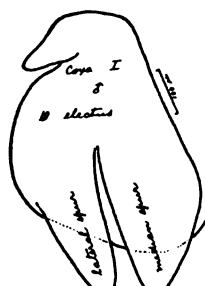


Fig. 103.

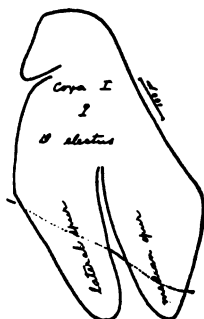


Fig. 104.

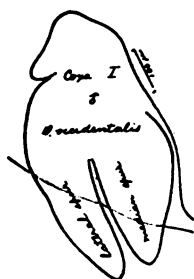


Fig. 105.



Fig. 106.

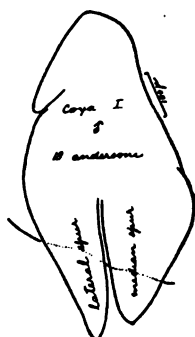


Fig. 107.

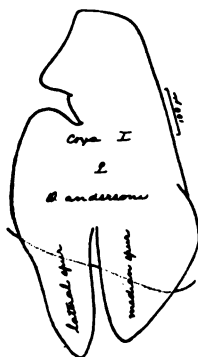


Fig. 108.

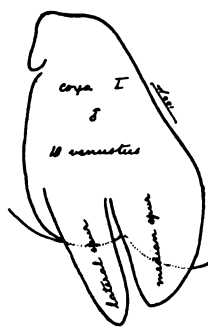


Fig. 109.

L. H. Wilder, Del.

Figs. 101-109.—COXA I OF DERMACENTOR.



Fig. 110.

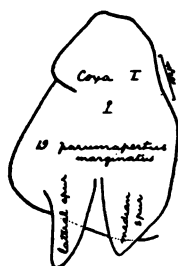


Fig. 111.

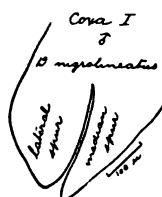


Fig. 112.

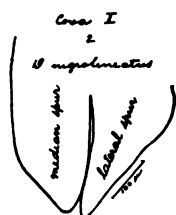


Fig. 113.

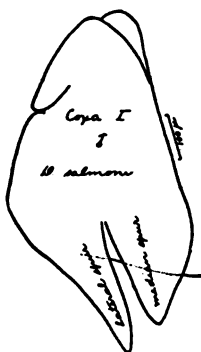


Fig. 114.

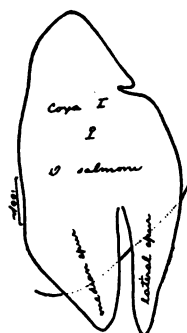


Fig. 115.

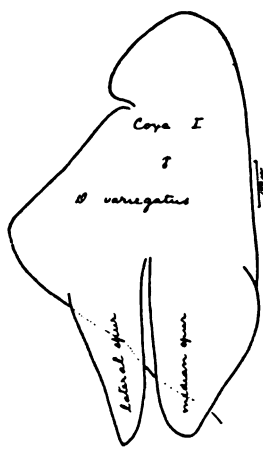


Fig. 116.

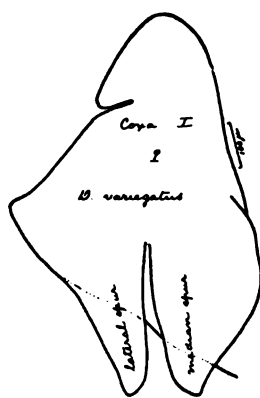


Fig. 117.

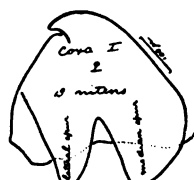


Fig. 118.



Fig. 119.

L. H. Wilder, Del.

Figs. 110-119.—COXA I OF DERMACENTOR.

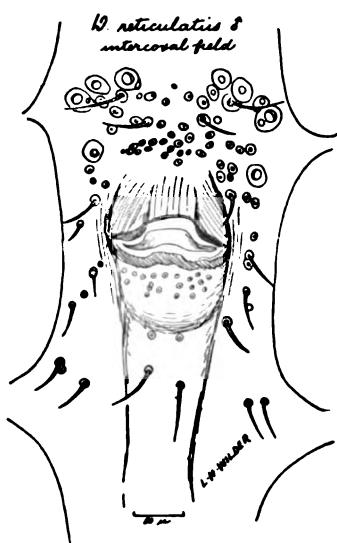


Fig. 120.

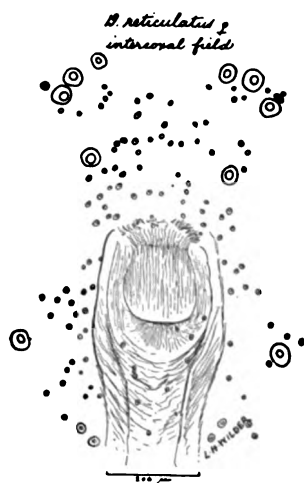


Fig. 121.

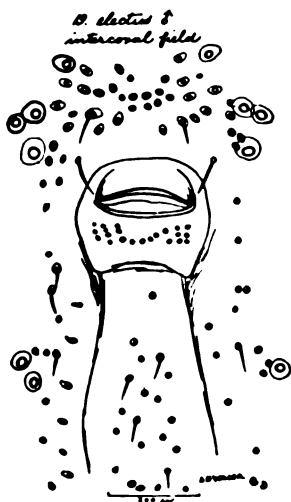


Fig. 122.

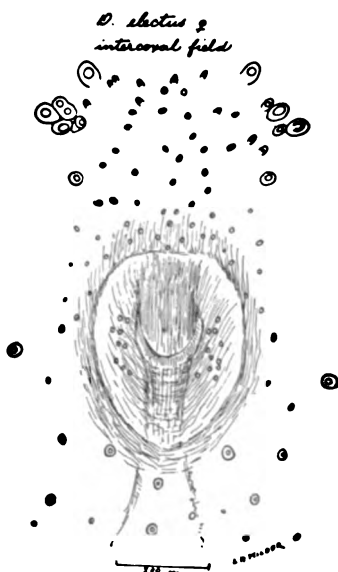
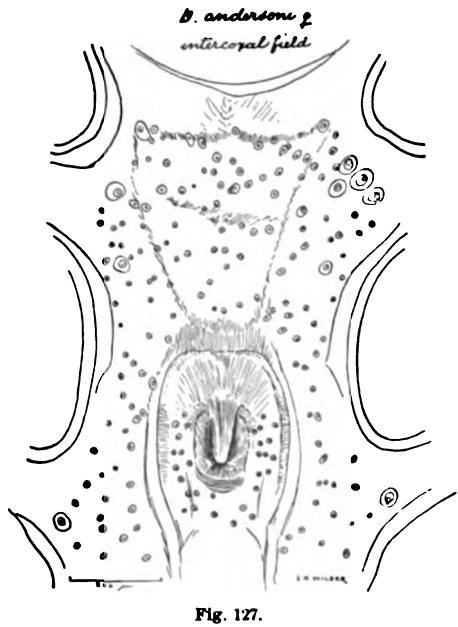
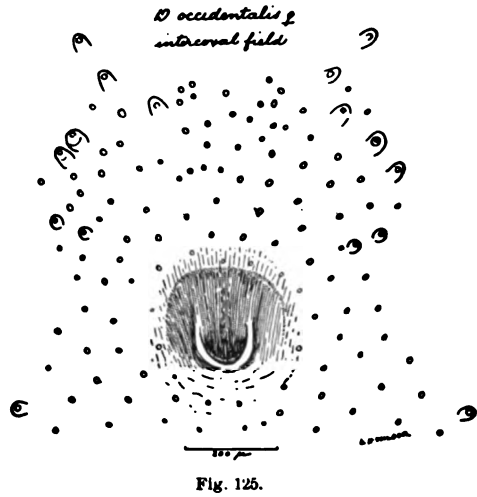
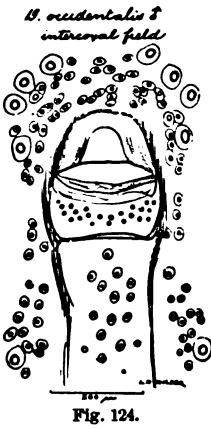


Fig. 123.

L. H. Wilder, Del.

Figs. 120-123.—INTERCOXAL FIELDS OF DERMACENTOR.



L. H. Wilder, Del.

Figs. 124-127.—INTERCOXAL FIELDS OF DERMACENTOR.

D. parsonaeptus marginatus ♂
intercoxal field

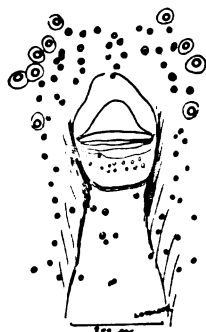


Fig. 128.

D. nigrolineatus ♂
intercoxal field

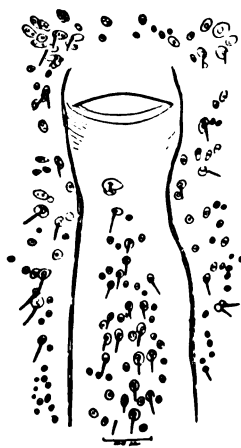


Fig. 129.

D. nigrolineatus ♂
intercoxal field



Fig. 130.

D. salmoni ♂
intercoxal field

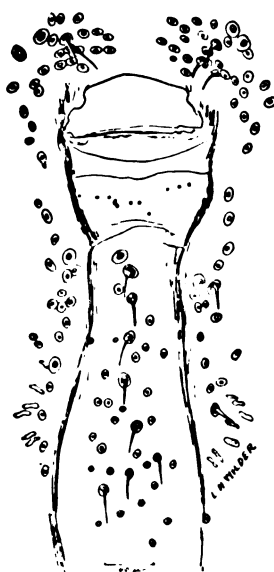


Fig. 131.

L. H. Wilder, Del.

Figs. 128-131.—INTERCOXAL FIELDS OF DERMACENTOR.

D. salomoni ♀
intracoral field

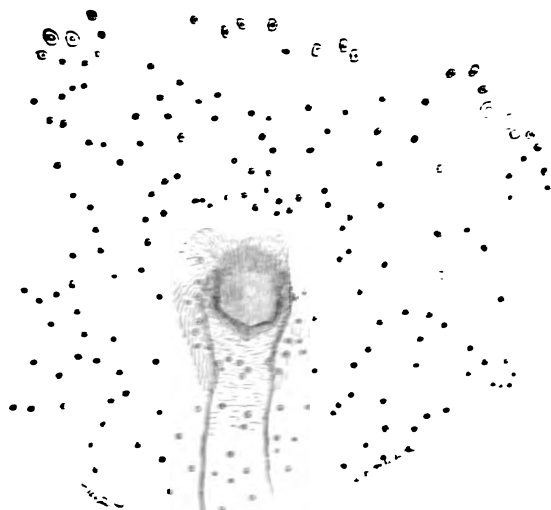


FIG. 12.

D. variegatus ♂
intracoral field



Fig.

D. rubens ♂
intracoral field



Fig.

Fig.

FIG. 13-14. INTRACORAL FIELDS OF DEEP-SEA TIPS

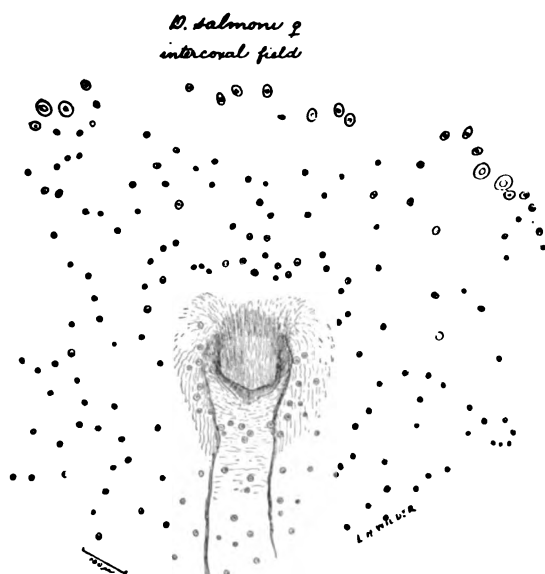


Fig. 132.



Fig. 133.



Fig. 134.

L. H. Wilder, Del.

Figs. 132-134 — INTERCOXAL FIELDS OF DERMACENTOR.

2 2 2

TREASURY DEPARTMENT
Public Health and Marine-Hospital Service of the United States

HYGIENIC LABORATORY.—BULLETIN NO. 63

JUNE, 1910.

DIGEST OF COMMENTS
ON THE
PHARMACOPŒIA OF THE UNITED STATES
OF AMERICA
[EIGHTH DECENNIAL REVISION]
AND THE
NATIONAL FORMULARY
[THIRD EDITION]

FOR THE CALENDAR YEAR ENDING DECEMBER 31
1907

BY
MURRAY GALT MOTTER
AND
MARTIN I. WILBERT



WASHINGTON
GOVERNMENT PRINTING OFFICE
1910

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United States Public Health and Marine-Hospital Service.

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PREFACE.

The literature of the year 1907, bearing on pharmacopœial matters, is of unusual interest in that it reflects the many and varied influences that have served to bring the Pharmacopœia of the United States and the National Formulary prominently to the attention of persons, both in and out of the professions directly interested, who had previously never had occasion seriously to consider either the uses or the requirements of such authoritative books.

The phraseology of the pure food and drugs act, June 30, 1906, has served to materially enlarge the field of usefulness of the Pharmacopœia and of the National Formulary by practically including their requirements as a portion of the law itself.

The acceptance of these two books as authoritative standards for the identity and purity of the substances described therein naturally attracted renewed attention to their shortcomings and errors, and the committees, in charge of their revision, this year authorized a number of changes and corrections.

These changes, in turn, attracted considerable attention and were widely discussed and commented upon. Prof. Joseph P. Remington, the chairman of the U. S. P. Committee on Revision, in discussing the changes in the pharmacopœia (*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 58) calls attention to the fact that they are by no means so important or so far-reaching as their total number would appear to indicate. He points out that of the total number of 431 changes enumerated no less than 157 were made necessary through the adoption of a single change in one part of the book necessitating a corresponding change in all other parts of the book.

The change in the status of these two books and the emendations that were authorized by the committees on revision, were accompanied by a lengthy and exhaustive discussion, in several pharmaceutical journals, on the desirability of bringing about a radical change in the method of revising these two books.

This discussion being, largely at least, mere expression of personal opinions, while noted is but imperfectly reflected in the pages of this bulletin; it being deemed advisable to restrict the references as much as possible to demonstrable facts rather than expressions of opinion on possibilities.

As illuminating the relative standing of the two authoritative books it may be pointed out that an editorial in the *Druggists Cir-*

cular (N. Y., 1907, v. 51, p. 397) in discussing the making of the U. S. P. and of the N. F. comments at some length on the origin and the legal standing of the associations now owning these books. It appears that the United States Pharmacopœial Convention and the American Pharmaceutical Association are both incorporated under the laws of the District of Columbia, so that so far as corporate existence is concerned they are practically on the same footing with the distinction that the United States Pharmacopœial Convention, which was founded in 1820 was not incorporated until 1900, while the American Pharmaceutical Association, founded in 1852, was incorporated in 1888.

As might be surmised the opinions that have been expressed on the desirability of introducing radical changes in the methods of revising these two books differ widely, and the student who is interested in the history or the economics of the subject will find much to interest him in this controversy which, as has been pointed out, embodies nothing really new, either in principle or intent.

There can be no mistaking the fact that public and professional interest in the U. S. P. and the N. F. is constantly increasing, and these books in the course of time will surely be more generally recognized as being important factors in safeguarding the public health.

One of the more active influences in this direction is the now widespread appreciation of the desirability of establishing international standards for widely used potent medicaments.

The protocol adopted by the Brussels conference for the unification of pharmacopœial formulæ for potent medicaments, is being generally adopted in foreign pharmacopœias, and the failure of the U. S. P. committee on revision to adopt these provisions in their entirety has been severely commented upon, particularly abroad, where the U. S. P. is pointed out as being the one conspicuous exception to the general adoption of the provisions of the Brussels conference protocol.

Some rather pertinent comments on this subject will be found under the general heading "International Standards" and more particularly under "Comments on the U. S. P. VIII relative to the requirements of the Brussels conference."

An even casual review of some of the recent foreign pharmacopœias will impress one with the desirability and the actual need of some form of international agreement regarding the nomenclature of important or widely used medicaments. Much diversity of opinion and practice yet persists and, in some instances at least, the similarity or even the identity of names for widely varying products would suggest that in addition to annoyance and uncertainty actual harm might result from the careless mistaking of one for the other.

It is generally recognized that for answering questions and for the general upbuilding of a science it is necessary to know what

has already been accomplished in that particular field and that, for this purpose, a systematic compilation of the literature relating to the science is of tremendous importance.

The cooperation of the Public Health and Marine-Hospital Service in developing the science of pharmacopœdics by the compilation of comments appearing in current literature is being appreciated by medical and pharmaceutical associations generally and more particularly by individuals who are directly interested in the use or the limitations of the books officially recognized in this country.

The difficulty of satisfactorily complying with the frequently made demand that the U. S. P. and the N. F. include all of the available synonyms is well illustrated by the common names for some of the American drugs included in Bulletin 107 of the Bureau of Plant Industry, U. S. Department of Agriculture, some of which are quoted in this bulletin.

Many of the abstracts from regular medical journals included in the present bulletin, were compiled by Dr. Robert A. Hatcher, professor of pharmacology and materia medica, Cornell University Medical School, New York, while temporarily connected with the Hygienic Laboratory of the Public Health and Marine-Hospital Service.

The thanks of the compilers are due to the librarians of the U. S. Department of Agriculture, the Office of the Surgeon-General of the U. S. Army, the Library of Congress, and to the Philadelphia College of Pharmacy, the Franklin Institute, and the College of Physicians of Philadelphia for the use of the files of the several periodicals not in the library of the Hygienic Laboratory.

The thanks of the compilers are also due, and are herewith extended to the secretaries of the several state pharmaceutical associations and to the secretary of the National Association of Wholesale Drug-gists for copies of proceedings; also to the publishers of a number of pharmaceutical and drug journals for the current numbers of their several publications, and especially to Professor van der Wielen, of Amsterdam, Holland, for six volumes of the *Pharmaceutisch Weekblad*.

In conclusion, the compilers desire to express their appreciation of the suggestions that have been received for perfecting the style and content of these bulletins, and beg to assure officers of the Public Health and Marine-Hospital Service and others who may have such suggestions to offer that they are appreciated and will, in so far as is possible, be utilized.

M. G. M.
M. I. W.

DIVISION OF PHARMACOLOGY,
HYGIENIC LABORATORY,
March 15, 1910.

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 Proc. Virginia Pharm. Ass., 1907.
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 Répert. de pharm., Par.—Répertoire de pharmacie, Paris, 1907, v. 19.
 Rep. Indiana Bd. Health.—Report, 26th Annual, Indiana State Board of Health, 1907.
 Rep. Massachusetts Bd. Health.—Report, 39th Annual, Massachusetts Board of Health, Boston, 1907.
 Rep. Missouri Bot. Gard., St. Louis.—Report, 19th Annual, Missouri Botanical Garden for 1907, St. Louis, 1908.
 Rep. North Dakota Agric. Exper. Sta.—Report, 18th Annual, Pt. II, North Dakota Agricultural Experiment Station, Bismarck, 1907.
 Rev. méd., Chile.—Revista médica de Chile, 1907, v. 35.
 Riedel's Berichte, Berlin, 1907.
 Riedel's Mentor, Berlin, 1907.
 Schweiz. Wchnschr. f. Chem. u. Pharm., Zürich.—Schweizerische Wochenschrift für Chemie und Pharmacie, Zürich, 1907, v. 45.
 Sc. Am. Suppl.—Scientific American Supplement, New York, 1907, v. 63, 64.
 Semi-Ann. Rep. Schimmel & Co.—Semi-Annual Report, Schimmel & Co., Miltitz, 1907.
 Spatula (The), Boston, 1907, v. 13, 14.
 Storrs Station Reports, Connecticut, 1907, 19th Annual.
 Suedd. Apoth. Ztg.—Süddeutsche Apotheker Zeitung, Stuttgart, 1907, v. 47.
 Svensk. farm. Tidskr.—Svensk farmaceutisk Tidskrift, Stockholm, 1907, v. 11.
 Tech. Quart., Bost.—Technology Quarterly, Boston, 1907, v. 20.
 Therap. Gaz., Detroit.—Therapeutic Gazette, Detroit, 1907, v. 31.
 Therap. Monatsh., Berl.—Therapeutische Monatshefte, Berlin, 1907, v. 21.
 Therap. d. Gegenw., Berl.—Therapie der Gegenwart, Berlin, 1907, v. 48.
 Therapist (The), London, 1907, v. 17.
 Tr. Am. Inst. Homoeop.—Transactions American Institute of Homoeopathy, Philadelphia, 1907, 63rd session.
 Tr. Am. M. Ass. Sec. Pharm. and Therap.—Transactions of the Section on Pharmacology and Therapeutics of the American Medical Association, 1907.
 Tropenpflanzer (Der), Berlin, 1907, v. 11.

- Western Druggist, Chicago, 1907, v. 29.
 Year Book of Pharmacy, London, 1907.
 Ztschr. d. allg. österr. Apoth.-Ver., Wien.—Zeitschrift des allgemeinen österreichischen Apotheker-Vereines, Wien, 1907, v. 45.
 Ztschr. f. anal. Chem., Wiesb.—Zeitschrift für analytische Chemie, Wiesbaden, 1907, v. 46.
 Ztschr. f. ang. Chem. Berl.—Zeitschrift für angewandte Chemie, Berlin, 1907, v. 20.
 Ztschr. f. anorg. Chem., Hamburg.—Zeitschrift für anorganische Chemie, Hamburg, 1907, v. 52-56.
 Ztschr. f. exper. Path. u. Therap.—Zeitschrift für experimentelle Pathologie und Therapie, Berlin, 1907, v. 4.
 Ztschr. f. öffentl. Chem.—Zeitschrift für öffentliche Chemie, Plauen i. V., 1907, v. 13.
 Ztschr. f. physik. Chem.—Zeitschrift für physikalische Chemie, Leipzig, 1907, v. 56.
 Ztschr. f. Unters. Nahr. u. Genussm.—Zeitschrift für Untersuchung der Nahrungs- und Genussmittel, Berlin, 1907, v. 13, 14.
 Zentrbl. Physiol. u. Path. d. Stoffwechs.—Zentralblatt für die gesammte Physiologie und Pathologie des Stoffwechsels, Berlin und Wien, 1907, v. 2.

2. TITLE ABBREVIATIONS—PHARMACOPŒIAS AND NONOFFICIAL STANDARDS.

- Ph. Austr. VIII.—Pharmacopœa Austriaca, editio octava, 1906.
 Ph. Belg. III.—Pharmacopœa Belgica, editio tertia, 1906.
 Ph. Brit. IV.—British Pharmacopœia, 1898.
 Ph. Dan. VII.—Pharmacopœa Danica, 1907.
 Ph. Fr. V.—Codex Medicamentarius Gallicus, Pharmacopée Française, 1908.
 Ph. Germ. IV.—Arzneibuch für das Deutsche Reich (Pharmacopœa Germanica, editio IV), 1900.
 Ph. Helv. IV.—Pharmacopœa Helvetica, editio quarta, 1907.
 Ph. Hisp. VII.—Farmacopea oficial española, séptima edición, 1905.
 Ph. Hung. III.—Pharmacopœa Hungarica, editio tertia, 1909.
 Ph. Ital. III.—Farmacopea ufficiale del regno d'Italia, terza edizione, 1906.
 Ph. Japon. III.—Pharmacopœa Japonica, 1906 (English Translation, 1907).
 Ph. Ndl. IV.—Pharmacopœa Nederlandica, editio quarta, 1905.
 Ph. Norv. III.—Pharmacopœa Norwegica, editio tertia, 1895.
 Ph. Port.—Pharmacopœa Portuguesa, 1876.
 Ph. Rom. III.—Pharmacopœa Romana, editio tertia, 1893.
 Ph. Russ. IV.—Pharmacopœa Rossica, editio quarta, 1891.
 Ph. Svec. IX.—Svenska Farmakopén (Pharmacopœa Svecica, ed. IX), 1908.
 U. S. P. VIII.—Pharmacopœia of the United States, 8th Dec. Rev., 1905.
 N. F. III.—The National Formulary of Unofficial Preparations, Baltimore, 1906.
 N. N. R.—New and Nonofficial Remedies, Chicago, 1907.
 B. P. C.—British Pharmaceutical Codex, London, 1907.

DIGEST OF COMMENTS ON THE PHARMACOPŒIA OF THE UNITED STATES OF AMERICA VIII, AND ON THE NATIONAL FORMULARY III.

I. GENERAL COMMENTS.

1. LEGAL STATUS AND DEVELOPMENT.

1. PURE FOOD AND DRUGS LAW.

Wiley, H. W., points out that the spirit of the food and drugs act is to assure the buyer that the drugs which pass from State to State are pure and up to the standard of strength required, that the proprietary remedies bear the legend which the law requires and that their labels be free from any statement, design, or device which is false or misleading in any particular.—*Am. J. Pharm. Phila.*, 1907, v. 79, pp. 7-10.

An editorial points out that the pure food and drug law is of paramount importance to the drug trade, and that from the standpoint of the public at large and from the immediate benefits to be derived this measure, overshadows all other accomplishments of the Fifty-ninth Congress.—*Oil, Paint and Drug Reporter*, N. Y., 1907, v. 71, Feb. 11, part 2, p. 3.

Carey, John N., asserts that members of the trade realize that the law is not only in the interest of the public who are entitled to pure foods and drugs, but it is also a blessing to honest manufacturers and dealers, because it protects them from the nefarious competition of those whose goods depend for their sale upon fraud and misrepresentation.—*Proc. N. W. D. A.*, 1907, 33d Ann. Meet., pp. 36-37.

Vanderkleed, Charles E., points out that the keynote of the food and drugs act is honesty, and that already we see the tangible evidences of a return to that spirit of frankness which should characterize, more than any other line of business, the buying and selling of medicines for the sick.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 56.

Stallman, A. C., discusses the influence of the federal food and drugs act on the drug trade generally.—*Proc. N. W. D. A.*, 1907, 33d Ann. Meet., pp. 155-157.

A report on the meeting of the American Extract Manufacturers Association calls attention to a number of papers read at the sessions

of that association, severely criticizing the present enforcement of the pure food and drugs law.—Pharm. Era., N. Y., 1907, v. 37, p. 493.

Wiley, H. W., discusses the preparations that have been made for the enforcement of the food and drugs act, and points out that the policy of the drug laboratory is to regard as drugs all ordinary food substances of mineral, plant, or animal origin which are recognized by the medical faculty as having valuable curative properties whenever specifically used for such purposes.—Ann. Rep. U. S. Dept., Agric., for 1907, 1908, pp. 381–393.

An editorial comments on the pure food and drugs act, and points out that the drug trade is probably entering upon an era of pure drug agitation that will make the war tax days of 1898 and 1901 seem tame by comparison.—New Idea, Detroit, 1907, v. 29, p. 198.

Francis, John M., expresses the belief that the enactment of the food and drugs act has had a very salutary effect upon the pharmaceutical trade, and while pharmaceutical manufacturers have found it more difficult to procure prime drugs, there has been a distinct improvement in many of the lines of chemical supplies.—Proc. Pennsylvania Pharm. Ass., 1907, p. 63.

The N. W. D. A. committee on adulterations asserts that:

The preparations of all the members of this association must be above question as to purity. We must therefore exercise all possible care in looking to the sources of our supplies, and insisting upon the purest possible products from every provider at first hand.—Am. Druggist, N. Y., 1907, v. 51, p. 256.

Kremers, Edward, is quoted as asserting that the pure food and drugs act is not nearly perfect now, nor is it the best obtainable from a purely theoretical point of view. The act is the result of popular demand and also the compromise product of two clashing interests.—Pharm. Era, N. Y., 1907, v. 37, p. 185.

An editorial calls attention to some mistaken notions as to the food and drugs act, and points out a number of things that the law does not do. The law does not prohibit adulteration but does in effect require that statements made on the label be true statements of fact.—Drug Topics, New York, 1907, v. 22, pp. 17–18.

An editorial states that one of the effects of the pure food and drugs act has been to put certain illegitimate concerns out of business, and apparently others will share the same fate.—J. Am. M. Ass., 1907, v. 48, p. 425.

An article reprinted from the New York Times asserts that the food and drugs law has fully justified the hopes of its friends and the apprehensions of its enemies.—Drug. Circ., N. Y., 1907, v. 51, p. 463.

Hallberg, C. S. N., thinks that section 7 of the food and drugs act means practically that any preparation may be made of any strength, provided the strength is named. He points out that this label requirement applies only to the original large packages of these cheaper

chemicals, and necessarily these labels are never seen by those who may use the chemicals as medicines.—Tr. Am. M. Ass. Sec. Pharm. and Therap., 1907, p. 20.

Lloyd, John Uri, discusses the food and drugs act and points out that in the list of drugs to be regulated by law, embracing more than a hundred items, not one of the drugs introduced by the eclectic fathers is given place.—Eclectic M. J., Cincin., 1907, v. 67, pp. 72-78.

Kebler, L. F., discourses on the interpretation of the word drug and points out that any preparation used, recommended, or advertised for the treatment or prevention of disease will be construed as a drug product.—Am. Druggist, N. Y., 1907, v. 50, p. 35.

A decision by the Secretary of Agriculture provides that a package may be marked so as to comply with the food and drugs law by either pen and ink, stamp, or typewriter, provided all such written or printed matter is distinctly legible and on the principal label as prescribed by regulation 17.—Am. J. Pharm., Phila., 1907, v. 79, p. 248.

An editorial calls attention to the efforts of some manufacturers to use the food and drugs act for purposes of deception, and states that the Secretary of Agriculture has issued a notice stating that the serial number is not a governmental guarantee.—J. Am. M. Ass., 1907, v. 48, p. 1356.

An editorial discusses the validity of the guaranty under the pure food and drugs act, and quotes from an opinion recently published by the Attorney-General.—Am. Druggist, N. Y., 1907, v. 51, p. 386.

An unsigned article comments on the pure food and drugs legislation, the proposed form of State law devised by the National Wholesale Grocers' Association, and outlines some of the pending legislation in the several States.—*Ibid.*, v. 50, p. 73.

Kibler, Ralph Emory, discusses the drugs and their derivatives that are mentioned in the food and drugs act, June 30, 1906, and presents some practical tests for their identification.—Proc. North Carolina Pharm. Ass., 1907, pp. 81-119.

A number of questions and answers on the practical application of the food and drugs act are presented.—New Idea, Detroit, 1907, v. 29, pp. 193-195.

Kebler, Lyman F., presents types of questions and answers relative to the pure food and drugs act of June 30, 1906.—Pharm. Era., N. Y., 1907, v. 27, pp. 29-31.

An editorial comments on the food-inspection decisions concerning the quantity or proportion of preparations containing opium or morphine used in other preparations, also the percentage of alcohol.—Drug Topics, New York, 1907, v. 22, pp. 49-50.

An editorial discusses the food and drugs act and the regulations that have been adopted for its enforcement.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 3.

An abstract calls attention to the rules and regulations that have been adopted as a guide in the enforcement of the food and drugs act.—*Pharm. J. Lond.*, 1907, v. 24, p. 24.

Food-inspection decisions 54–83 were issued during 1907. These food-inspection decisions have been reprinted in a number of drug journals, such as *Oil, Paint and Drug Reporter*, *Meyer Bros. Druggist*, and *Pharmaceutical Era*.

2. THE PHARMACOPEIA AS A LEGAL STANDARD.

Wiley, H. W., in discussing the provisions of the food and drugs act points out that the law is more simple in its provisions concerning drugs than foods. Those that are mentioned in the *Pharmacopœia* or *National Formulary* are required to conform to the standards set up by those two standards, or books, so that here the chemist has no discretion, as the standards are determined by chemical analysis.—*Pharm. Era.*, N. Y., 1907, v. 37, p. 55.

Rusby, H. H., points out that the U. S. P. for many decades was one of the most useless though one of the best books of the kind, and now that it is being put to a really useful purpose its practical defects are shown to be serious, even fatal in some directions, but we may confidently expect that this exposure will lead in the near future to as great a perfection in this direction as this work has always exhibited in purely scientific lines.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 252.

Remington, Joseph P., asserts that after the food and drugs act had been signed manufacturers freely criticised the U. S. P. because for the first time in one hundred years the *Pharmacopœia* touched their pocketbooks. This criticism has made the work of correction and addition easy, and with the approval of the Bureau of Agriculture in Washington, the Secretary of the Treasury, and the Secretary of Commerce and Labor, the committee on revision had to make some corrections in the *Pharmacopœia* in order to make a book on which prosecutions can be based.—*Tr. Am. M. Ass., Sec. Pharm. and Therap.*, 1907, p. 173.

Kraemer, Henry, believes that the passage of the pure food and drugs act must be credited with being the cause of a more critical examination of the *National Formulary* and the *Pharmacopœia* than would otherwise have been the case.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 246.

Schieffelin, Wm. J., in discussing the testing of drugs by government experts, asserts that dealers will have to stand for any deficiency in pharmaceutical knowledge of the government experts. He asserts that the U. S. P. is far from perfect and that it is important for manufacturers and dealers to have standards that are readily complied with at as early a date as is possible.—*Pharm. Era.*, N. Y., 1907, v. 37, p. 95.

An editorial points out that now that the pure food and drugs law is in active operation and requires so many rulings dependent upon the Pharmacopœia for interpretation, the lack of affinity between the authority of the revision committee and the departments at Washington is all the more pronounced.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 71, April 29, p. 8.

Lyons, A. B., discusses the Pharmacopœia and its standards, the complaints that have been made, the changes needed and the idea of making the Pharmacopœia a government publication.—*Am. Druggist*, N. Y., 1907, v. 51, p. 278.

Teeters, W. J., says that by the federal food and drugs law the Pharmacopœia became the national standard by law. It was soon discovered that many of the standards of the Pharmacopœia were too high and impossible of being met owing to existing conditions in the drug and chemical market. The revision committee have issued a long list of corrections which should be pasted in the book.—*Proc. Iowa Pharm. Ass.*, 1907, p. 25.

An editorial discusses the provisions of the pure food and drugs law which permits variations from the Pharmacopœia or National Formulary, providing these variations be properly stated on the label, and calls attention to the possibility of having this provisional clause eliminated in state laws.—*Am. Druggist*, N. Y., 1907, v. 50, p. 320.

Schultze, Louis, asserts that the profession can be justly proud of the position the Pharmacopœia has maintained after a thorough trial. The committee on revision have recently published an extensive list of corrections which the passage of the pure food and drugs act, June 30, 1906, has rendered it advisable to make in the Pharmacopœia. While it is to be regretted that this was necessary, it is only proof of the earnest wish of the revision committee to make the Pharmacopœia a just standard. It was found that many of the standards and requirements were too high and stringent for practical commercial purposes, and these were wisely modified to suit existing conditions over which the committee have no control.—*Proc. Maryland Pharm. Ass.*, 1907, p. 43.

Remington, Joseph P., in a report to the board of trustees explains the reasons and the need for making the corrections in the U. S. P. VIII.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 415.

Several communications discuss the interpretations to be placed on the limitations of pharmacopœial titles as indicated in the preface of the U. S. P., p. 39, which provides that only medicinal articles and substances for medicinal purposes are expected to conform to the requirements of the U. S. P.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, pp. 83-84.

The additions and corrections to the U. S. P. VIII issued May 1, 1907, are reprinted.—*Am. Druggist*, N. Y., 1907, v. 50, p. 326. (See also other drug journals.)

Main, Thomas F., reports on the efforts that were made by the N. W. D. A. committee on standards and tests of the U. S. P. and N. F., calls attention to a number of the corrections that have been made in compliance with their request, and points out that the U. S. P. committee of revision met the N. W. D. A. committee half way on belladonna leaf, changing the standard from 0.35 to 0.30 mydriatic alkaloids; acceded partially to their request in changing standard of jalap from resin 8 per cent to resin 7 per cent, and fully met their wishes in regard to ipecac root, stramonium and colchicum seed.—*Proc. N. W. D. A.*, 1907, 33d. Ann. Meet., p. 160.

An editorial points out that the relations between the United States Government and the Pharmacopœial Convention are not as well defined as they might be, and that they should be more fully and more generally understood.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 71, p. 8.

Stallman, A. C., in the report of the committee on adulterations, asserts that the health of the public is largely in our hand, for if the people can not depend upon pure drugs when they are prescribed we are in ill case indeed.—*Proc. N. W. D. A.*, 1907, 33d. Ann. Meet., p. 156.

An editorial discusses the validity of changes made in the strength of U. S. P. articles and concludes that the pure food and drugs act was evidently drawn up to cover necessary changes, and that the committee on revision of the U. S. P. is clearly authorized by its instructions from the Pharmacopœial Convention to make such changes as they may find to be necessary.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 289.

An editorial doubts the legality of making additions and corrections to the U. S. P. VIII and asks for opinions on the question, believing that the drug trade should know exactly and without doubt which are the standards to which they must conform.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 79.

An editorial commenting on changes and corrections in the U. S. P. points out that these corrections are almost entirely confined to the physical constants of chemicals, which would never have been subject to this careful scrutiny but for the fact of the Pharmacopœia becoming the legal standard.—*Bull. Am. Pharm. Ass.*, Chicago, v. 2, p. 197.

A news item reports an interview with Dr. H. W. Wiley, Chief of the Bureau of Chemistry, who expressed his entire willingness to be guided by the Pharmacopœia as modified by the committee on revision. Under Doctor Wiley's construction of the law the changes

that may be made in the Pharmacopœia from time to time will go into force automatically, so far as the execution of the national pure food and drug law by the Department of Agriculture is concerned.—Oil, Paint and Drug Reporter, New York, 1907, v. 71, April 29, p. 55.

Barnard, H. E., summarizes the results of a previous investigation on the status of the drug market and concludes that the retail druggist should observe more care in the preparation of his goods, discard old formulas, buy pharmacopœias of the latest edition, and insist upon guarantees of purity from the wholesaler with whom he deals.—Rep. Indiana Bd. Health, 1907, pp. 183–185.

Whelpley, H. M., asserts that of the present revision of the U. S. P. over 50,000 copies have been sold, more copies than drug stores in this country, and only a short time back only between 5,000 and 10,000 copies were sold of the former revisions.—Proc. Arkansas Pharm. Ass., 1907, p. 68.

A news note reports an amendment to the food and drugs law proposed by Senator Gallinger of New Hampshire, which provides for the recognition of the homœopathic pharmacopœia as being equal to the U. S. P.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, December 9, p. 25.

3. SUPPLEMENT TO THE PHARMACOPŒIA.

At the meeting of the board of trustees of the U. S. Pharmacopœial Convention held on December 8, 1906, the chairman of the committee of revision was authorized to have the plates cut and necessary corrections made in the text of the U. S. P. before further copies were printed for sale.—Meyer Bros., Drug., St. Louis, 1907, v. 28, p. 37.

Good, J. M., asserts that chemists, partially because of the pure food and drugs law, are responsible for the revision of the U. S. P. VIII published in 1907.—Nat. Druggist, St. Louis, 1907, v. 37, p. 64.

Remington, Joseph P., asserts that the corrections and emendations which have been sent in so far have not equalled those which were made in either the revision of 1880 or 1890, and it must be remembered that the previous pharmacopœias were not subjected to severe scrutiny because the tests contained therein were not obligatory upon manufacturers, and, in fact, they were largely ignored.—*Ibid.*, v. 37, p. 90.

An unsigned article points out that the U. S. P. revision committee approves of the N. W. D. A. recommendations, and votes to amend standards and tests of drugs in accordance with the suggestions of the committee of that association.—Am. Druggist, N. Y., 1907, v. 50, p. 109.

Vanderkleed, Charles E., calls attention to the changes that have been made in the text of the Pharmacopœia, and points out that many of these changes are of such a nature as to render of U. S. P. purity and standard many drugs and chemicals on the market which, under a strict application of the original text of the Pharmacopœia were not up to standard. He suggests that familiarity with these changes can best be had by going through the Pharmacopœia, page by page, and marking the correction in the text or in the margins, and that it is only in this way that the changes become intelligible, as the corrections in the pamphlet are listed according to pages and lines and not according to titles.—Proc. Pennsylvania Pharm. Ass., 1907, p. 58.

An editorial discusses the proposed new edition of the U. S. P. VIII and points out that it is not the intention to issue what is well understood to be a revision of the book, but that all that is contemplated is the publication of a list of corrections and emendations to be furnished, to each purchaser of a Pharmacopœia, at the cost of a 2-cent stamp.—Nat. Druggist, St. Louis, 1907, v. 37, p. 79.

An editorial points out that—Yielding to pressure which pharmacists have exerted on them for some time, reinforced by a request from importers and manufacturers, the revision committee of the United States Pharmacopœial Convention has made a few changes in the standards of crude drugs and the galenical preparations into which they enter.—Drug. Circ., N. Y., 1907, v. 51, p. 245.

Remington, Joseph P., reports that the total number of changes of all kinds was 431 in a total of 1,297 articles, test solutions and assays, but of this number, 431, 157 were changes made necessary through the adoption of one change in one part of the book which compelled a similar correction in other parts of the book. A further analysis reveals the fact that the physical constants which had to be changed, such as specific gravity, melting points, boiling points, saponification and iodine value, optical rotation, solubility, congealing point, ash and residue after incineration, amounted to 83.—Meyer Bros., Drug., St. Louis, 1907, v. 28, p. 446.

Sayre, L. E., in discussing the additions and corrections to June 1, 1907, points out that the great majority of the corrections of the Pharmacopœia have been mainly verbal and are of no special importance. There are certain facts, however, that represent concessions to the wholesale trade and the manufacturing chemists, the latter having stated that certain high standards were practically impossible.—Bull. Kansas Bd. Health, 1907, pp. 107-108.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 101), state that on the part of the American pharmacopœia committee, supplements to the U. S. P. VIII, have been published on the 1st of May and 1st of June, 1907, which contain partly corrections of various statements and partly additions to the individual articles. In the

case of the essential oils, various alterations have also been made, but unfortunately not to such an extent as, in their opinion, appeared desirable.

An editorial discusses the reasons why the changes in the Pharmacopœia were made, the status of the revision committee and its relation to the federal authorities.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 71, April 22, p. 7.

Stallman, A. C., reports that it is gratifying to learn that the National Formulary and Pharmacopœia will be revised still further, and thus conform to the natural qualities of pure drugs, as demonstrated to the revisers by proper experts.—*Proc. N. W. D. A.*, 1907, 33rd. Ann. Meet., p. 156.

The additions and corrections to the U. S. P. VIII to May 1st, and the supplementary list of June 1, 1907, are reprinted.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, p. 247. (See also other drug journals.)

Murray, Benjamin L., in discussing the additions and corrections to June 1, 1907, asserts that revision of the Pharmacopœia by spasmodic proclamation or publication is hardly the ideal method of revision, but that under the existing conditions no better plan is available.—*Merck's Report N. Y.*, 1907, v. 16, p. 247.

Main, Thomas F., is reported as having presented to the board of trustees of the U. S. Pharmacopœial Convention, a communication requesting the publication of annual supplements to the U. S. P. The board of trustees reply that they are without authority to issue such annual supplements.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 37.

4. THE PHYSICIAN AND THE PHARMACOPŒIA.

Hatcher, Robert A., in discussing the neglect of the U. S. P. on the part of medical men points out that it must come to be considered a distinction, a privilege, and a duty on the part of delegates to be present and to participate actively in the deliberations of the Pharmacopœial Convention, and that physicians can not escape just censure if they neglect this evident duty.—*Tr. Am. M. Ass. Sec. Pharm. and Therap.*, 1907, p. 169.

Remington, Joseph P., points out that the U. S. P. represents the combined labors of both the medical and pharmaceutical professions and now, since it has become the standard through the enactment of the food and drugs act, there has never been a better time in the history of the United States for physicians and pharmacists to join hands and to embrace this opportunity for perfecting the standard.—*Ibid.*, 1907, p. 15.

Simmons, George H., expresses the hope that the medical profession will have more to say about the next revision than has been the case in the past.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 490.

Hemm, Francis, asserts that the entire therapeutics of the Pharmacopœia and the National Formulary must be dictated by the medical profession.—*J. Am. M. Ass.*, 1907, v. 48, p. 889.

Kraemer, Henry, believes that with the expressed desire of the medical men to assist in selecting those drugs and medicines which shall be admitted into the Pharmacopœia, it only remains for the members of the pharmaceutical profession to provide the descriptions, tests, and methods of preparation.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 487.

Osborne, O. T., for the committee on the U. S. P. of the section on pharmacology and therapeutics of the American Medical Association reported that the U. S. P. though comprehensive and scientific is impractical for practicing physicians. Among its many disadvantages it contains too many worthless preparations of many worthless drugs. The U. S. P. should be educational, up to date, and offered to the physician in such a size and form as to induce him to buy and use it.—*Tr. Am. M. Ass. Sec. Pharm. and Therap.*, 1907, pp. 200–201.

Remington, Joseph P., thinks that the physicians of this country do not quite grasp the fact that the U. S. P. is the law of the land, and that its first valuation and its greatest function is to provide a standard for purity and for strength.—*Ibid.*, 1907, p. 173.

Bodemann, Wilhelm, discusses the increasing interest of physicians in the Pharmacopœia, and in official preparations and points out the need for pharmacists confining themselves to legitimate pharmacy.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 720.

Good, J. M., in discussing the relation of the physician to the pharmacopœia asserts that the successful diagnostician secures the praise of his professional brethren. The man who not only differentiates diseases but who is able to meet and cure or modify them by the use of the most appropriate remedies receives the gratitude and praise of all.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 64.

A book review of the "The Pharmacopœia and the Physician" expresses the belief that this book will go a great way toward interesting the physician in the Pharmacopœia and cause him to be more deeply concerned in subsequent revisions of that work.—*Am. J. Pharm.*, Phila., 1907, v. 79, pp. 233, 234.

Benedict, A. L., outlines general principles for reducing the armamentarium of the physician to practical limitations. Among others: Use active principles whenever satisfactorily available. In general, one salt of an alkaloid or other active base can be selected for universal use. Hundreds of herbs that are merely astringent or have effects that are scarcely demonstrable can be dispensed with. A new drug, such as a synthetic proprietary, representing a minor change of an established one, should not be used.—*Critic and Guide*, New York, 1907, v. 9, p. 20.

Remington, Joseph P., asserts that much work remains to be done before the physicians of the United States will take much interest in revising the Pharmacopœia.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 85.

Resolutions requesting the more general use of the U. S. P. as a text-book in medical schools were adopted at the meeting of the American Pharmaceutical Association.—Proc. Am. Pharm. Ass., 1907, v. 53, p. 104.

5. U. S. P. CONVENTION REPRESENTATION.

Whelpley, H. M., asserts that the U. S. P. Convention of 1910, which meets at Washington the first week in May of that year, will undoubtedly be the most important convention of the kind ever held. He suggests that state pharmaceutical associations and also state medical societies should send delegates, and these delegates should prepare for the occasion by carefully studying the constitution and by-laws of the convention and familiarizing themselves with the part which they may take in the deliberations.—Proc. Arkansas Pharm. Ass., 1907, p. 67.

An editorial discussing the liability of enlarging the Pharmacopœial Convention, points out that when this change does take place it will behoove the retail drug trade and the practitioners of medicine to see that their interests are not overshadowed, otherwise the Pharmacopœia will become a work of practical value only to the manufacturing and jobbing interests.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 91.

Hatcher, Robert A., in discussing the lack of interest that has been evinced by the medical men in the Pharmacopœial Convention expresses the belief that the spirit that has been evinced by pharmacists is worthy of emulation and that they may point with pride to their share of the work.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, p. 163.

Hoffmeister, Edward, urges upon the dental profession a closer communion with the U. S. P., to give it the support which is so often denied but which it richly deserves, and expresses the hope that the Pharmacopœial Convention of 1910 may have as representatives of the dental profession, if not delegates from the various colleges and state and district associations, at least members from the National Dental Association, through whom matter of peculiarly dental importance can be submitted.—Dental Cosmos, Phila., 1907, v. 49, pp. 573-577. (For discussion see p. 604.)

Squires, G. Brenton, closes an interesting review of the new Pharmacopœia with the statement that dentistry is recognized as a special branch of medicine, and is represented by 35,000 to 40,000 practitioners in this country. A number of medicinal agents used ex-

tensively by dentists may seldom be used by physicians. Such articles should be made U. S. P. products. For this reason we should be represented in the revision of the Pharmacopœia.—Dental Cosmos, Phila., 1907, v. 49, p. 845. (See also under Additions.)

Maxfield, G. A., thinks the dental profession may make its influence felt through the American Medical Association. As the section on stomatology is entitled to one delegate in the Pharmacopœial Convention, it is for the members of that section to see that they are represented.—*Ibid.*, v. 49, p. 848.

Remington, Joseph P., writing to President M. F. Finley, under date of July 25, 1906, says:

The next convention for the revision of the U. S. P. will assemble in the city of Washington on the first Monday of May, 1910. My personal opinion is that the National Dental Association delegates would be given a welcome at the convention, with the privileges of the floor. I think it would require a resolution passed by the convention to receive the delegates as full members. I would advise writing to the president of the convention, Dr. H. C. Wood, about January, 1910. He will probably authorize the appointment of delegates from your body.—*Ibid.*, v. 49, p. 168.

Rodgers, C. W., thinks the U. S. P. too much behind the times for the progressive dentist to wait for, and questions whether the large manufacturing houses can not and do not put up more reliable preparations than the small druggists working upon a pharmacopœial basis.—*Ibid.*, v. 49, pp. 845-847.

An editorial discusses the desirability of having the Pharmacopœial Convention meet more frequently than once in ten years, and points out that because of the fact that the committee of revision is authorized to issue supplements to the Pharmacopœia an interval of ten years is not too great.—Meyer Bros., Drug., St. Louis, 1907, v. 28, p. 465.

6. COMMITTEE OF REVISION.

Schieffelin, William J., is reported as having pointed out that the mere size of the present committee was one of the most serious objections to it, as its size renders it somewhat unwieldy.—Am. Druggist N. Y., 1907, v. 51, p. 53.

Good, J. M., believes that the revision of the Pharmacopœia can not be undertaken by a smaller committee. "In the multitude of counsellors there is safety." Continuous work on the revision would be advantageous and the present machinery might be improved.—Drug. Circ., N. Y., 1907, v. 51, p. 488.

Remington, Joseph P., points out that the committee of revision labored unceasingly and successfully, on the whole, or the United States Government never would have adopted the book as a standard in the food and drugs act.—Nat. Druggist, St. Louis, 1907, v. 37, p. 90.

An editorial reviewing the making of the U. S. P. expresses the belief that the Pharmacopœia in the future will either be issued under direct government control by a commission representing the retail drug trade, practitioners of medicine, and the medical and analytical chemists, or the National Convention will be recognized in such a manner that the great manufacturing interests and jobbing trade will have a voice in the deliberations and representation in the work of revision.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 91.

Tyrer, Thomas, expresses the belief that the constitution and composition (personnel) of the U. S. P. committee is a model worthy serious consideration by the British authorities.—Pharm. J. Lond., 1907, v. 25, p. 137.

Whelpley, H. M., discussing the manner in which the Pharmacopœia is made points out that at the present time of the 26 members of the committee of revision only 5 are actual practitioners of medicine, and 3 out of these 5 are specialists not interested in general medicine.—Proc. Arkansas Pharm. Ass., 1907, p. 66.

Remington, Joseph P., asserts that every one will admit that the medical profession has been grossly negligent of its duties in the past, but that the physicians who were members of the committee of revision of the Pharmacopœia did their duty.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, p. 170.

The N. W. D. A., at its annual meeting held in Denver, Colo., adopted resolutions providing:

That it is the sense of this association that there be added to the committee on revision of the Pharmacopœia several chemists of large experience in manufacturing and one or more druggists who are thoroughly familiar with the drug markets of the world.—Merck's Report, N. Y., 1907, v. 16, p. 335.

Main, Thomas F., discusses the necessity for the establishment of a pharmacopœia research laboratory.—Proc. N. W. D. A., 1907, 33d Ann. Meet., pp. 163–164.

Schär, Edward, describes the method of making the Ph. Helv.—Drug. Circ., N. Y., 1907, v. 51, p. 559.

7. VALUE OF CRITICISMS.

Remington, Joseph P., thinks that cooperation of all interested parties should be cheerfully given to make the U. S. P. a book as nearly perfect as possible, and that where there is a spirit of helpfulness on the part of all concerned the ultimate result must be success.—Nat. Druggist, St. Louis, 1907, v. 37, p. 90.

Cohn, Alfred I., thinks that fair, impartial criticism is always in order and always makes for progress. Without it there would be no progress. When, therefore, we disagree with the substance of the text or can offer an improvement it is not alone proper but it is our duty to call attention to the point. If the point has already been

previously considered, well and good, no harm has been done; if new and valuable, a distinct improvement has been effected.—*Proc. New York Pharm. Ass.*, 1907, p. 232.

Good, James M., asserts that during the sixteen months of its official life the Pharmacopœia has received both praise and adverse criticism. Kindly criticism has been invited by the committee.—*Pharm. Era*, N. Y., 1907, v. 37, p. 80.

Wilcox, R. W., is reported to have said that all criticisms of the Pharmacopœia were welcomed for greater accuracy and the making of a more valuable book. He said that the showing made by the Council on Pharmacy and Chemistry showed that the American Medical Association was totally unfit to undertake the work.—*N. York M. J.*, 1907, v. 85, p. 1095.

An editorial discusses several recent communications on the Pharmacopœia and the importance of developing an active interest in the coming Pharmacopœial Convention.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, p. 355.

The N. A. R. D., at its annual convention, adopted the following resolution:

Resolved, That the editors of the various pharmaceutical journals be requested to refrain from publishing criticisms and reflections upon the U. S. P. and N. F. preparations, as such articles seriously hinder us in our propaganda work and tend to place discredit upon the volume in the estimation of the physicians.—*Merck's Report*, N. Y., 1907, v. 16, p. 306.

An editorial comments on the resolutions adopted by the National Association of Retail Druggists requesting the editors of the various pharmaceutical journals to refrain from publishing criticisms and reflections upon the U. S. P. and N. F. preparations, and points out that it is a very un-American procedure to attempt to suppress legitimate criticism.—*Am. Druggist*, N. Y., 1907, v. 51, p. 301.

Remington, Joseph P., is reported as asserting that the experiences that have been gained during the past year will be of incalculable value to the committee in its future work. He believes that considerable stress should be laid on the need for standards being such as are attainable and not too high.—*Ibid.*, v. 51, p. 311.

2. SCOPE.

1. NATURE AND CONTENT OF THE PHARMACOPŒIA.

Remington, Joseph P., as chairman of the committee of revision, announces the following changes and corrections in the standards of the U. S. P. VIII:

Belladonna leaf *now* 0.3 per cent mydriatic alkaloids.
 Belladonna root *now* 0.45 per cent mydriatic alkaloids.
 Colchicum seed *now* 0.45 per cent of colchicine.
 Ipecac *now* 1.75 per cent of ipecac alkaloids.

Stramonium *now* 0.25 per cent of mydriatic alkaloids.

Fluidextract of Belladonna root *now* 0.4 gm. alkaloids in 100 cc.

Tincture of Belladonna leaf *now* 0.03 gm. alkaloids in 100 cc.

Fluidextract of Colchicum seed *now* 0.4 gm. alkaloids in 100 cc.

Tincture of Colchicum seed *now* 0.04 gm. alkaloids in 100 cc.

Fluidextract of Ipecac *now* 1.5 gm. alkaloids in 100 cc.

Fluidextract of Stramonium *now* 0.25 gm. alkaloids in 100 cc.

Extract of Stramonium *now* 1.0 per cent alkaloids.

Tincture of Stramonium *now* 0.025 gm. alkaloids in 100 cc.

Jalap root *now* 7 per cent of total resin.

Under the article Petrolatum, p. 336, U. S. P., last paragraph, the sulphuric acid test has been dropped. February 15, 1907.—Am. J. Pharm. Phila., 1907, v. 79, p. 135.

The corrections and changes authorized by the committee of revision of the U. S. P. and the committee on N. F. of the A. Ph. A., appear in full.—Drug. Circ., N. Y., 1907, v. 51, pp. 436-439. (See also other drug journals.)

Remington, Joseph P., discusses the changes that have been made in the U. S. P. VIII during recent months and the reasons for making them.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 58-62.

Hopkins, J. L., in an open letter to the chairman of the committee on revision, opposes lowering the U. S. P. standards for crude drugs, and points out that at a time when public sentiment is demanding not merely compliance with established standards, but generally higher standards for all articles sold for the maintenance or protection of human life, any suggestion that the standard for medicine, as established by the U. S. P., be reduced, is, in his judgment, ill-advised and regrettable.—Pharm. Era., N. Y., 1907, v. 37, p. 14.

An editorial calls attention to the list of changes and corrections ordered to be made in the U. S. P. and the N. F. and points out that while these changes are numerous many of them are of minor significance. At the same time some are of great importance and all should be noted in the pages of the books already published; some 50,000 of the U. S. P. and 14,000 of the N. F.—Drug. Circ., N. Y., 1907, v. 51, p. 397.

An editorial points out that notwithstanding the assertion of the revisers that the corrections so far issued were few and unimportant, a scrutiny of the list gives one a contrary impression. The corrections are both numerous and important. A minor criticism in this connection is that the form in which the "corrections" have been sent out is not satisfactory to those who have to use the Pharmacopœia for constant reference.—Am. Druggist, N. Y., 1907, v. 50, p. 351.

An editorial in calling attention to an additional installment of corrections for the Pharmacopœia, points out that a Pharmacopœia is practically useless so long as it is known to abound in errors and one does not know what or where those errors are.—Drug. Circ., N. Y., 1907, v. 51, p. 456.

Dohme and Englehardt discuss some of the changes made in the strength of official substances because articles of the original standard of strength or purity were difficult to obtain. They also assert that in a few instances the requirements are rather lenient.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 377-381.

Lyons, A. B., discussing the changes in the Pharmacopœia, says: A list of 200 changes looks ugly and the revision committee will be charged with gross carelessness or incompetence or both. I venture to say, however, that no body of men, large or small, could have carried out an undertaking of such magnitude without leaving their work open to equally harsh criticism under the circumstances, *viz.*, of having the book put to an unforeseen use.—*Ibid.*, v. 55, p. 64.

An editorial asserts that the changes that have been made in the U. S. P. have been recognized by the Bureau of Chemistry as being perfectly proper and under the law are considered as being of the same force as the original text of the book.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 346.

Wilbert, M. I., calls attention to the comments on the future trend in pharmacopœial revision that have been discussed in drug journals. All agree that the present Pharmacopœia with all its faults and shortcomings is a credit to American pharmacy and that all future efforts should be concentrated on making the coming revision at least equally if not more representative of the best that American pharmacy is capable of.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 421.

Hatcher, Robert A., in discussing the miscellaneous nature of the articles now official in the U. S. P. asserts that this condition is not creditable to the medical profession, for it is not the province of pharmacists to decide for physicians what they are to use.—*Tr. Am. M. Ass. Sec. Pharm. and Therap.*, 1907, pp. 162-163.

He thinks it very important that the Pharmacopœia should be in fact, as well as in theory, an authoritative list of remedials. It should represent all that is best in therapeutics.—*Ibid.*, 1907, p. 163.

Remington, Joseph P., suggests that the American Medical Association should appoint a committee to take up the subject of revision of the Pharmacopœia and to prepare a report on drugs and preparations suitable for admission to the next Pharmacopœia.—*Ibid.*, 1907, p. 15.

2. NOMENCLATURE.

An unsigned article (*Bull. Torr. Bot. Club*, 1907, v. 34, pp. 167-178) presents the American code of botanical nomenclature which differs from the Vienna rules in a number of instances, some of which are pointed out in the abstract.—*Just's Bot. Jahresbr.*, Berl., for 1907, 1909, p. 160. (See also p. 161.)

Beringer, George M., points out that the method of citing botanical sources and authorities by the final addition in brackets of the common or English name of the plant grates harshly on the minds of

those who are accustomed to see and use botanical binomials correctly.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 360.

The committee on the U. S. P., of the American Medical Association, expresses the opinion that the chemical names are too long for daily use.—*Pharm. J. Lond.*, 1907, v. 25, p. 197.

An editorial suggests that the committee of revision take advantage of the proposed revision of the U. S. P. VIII, and include the names of synthetic chemicals under their identifying titles, their trade names, instead of under chemical titles which few pharmacists and fewer physicians are likely to remember or try to remember.—*West-ern Druggist, Chicago*, 1906, v. 29, p. 3.

Solis-Cohen, S., states that the name which a new substance receives, such as "phenacetin" is the name by which it should be known and by which it should become official if it does get into the *Pharmacopœia*; otherwise the name remains proprietary and the text-books become huge advertising machines for the proprietors.—*J. Am. M. Ass.*, 1907, v. 48, p. 197.

Thrush, M. C., points out that a fact that no one can dispute is that a few physicians in the practice of medicine to-day are using the new official names as mentioned in the last *Pharmacopœia* for such additions as sulphonal, trional, phenacetin, and the like, and the same fact applies to the changes in nomenclature in the old preparations, as for example, few physicians write arsenic trioxidum for acidum arsenosum, phenol for acidum carbolicum, phenylis salicylas for salol, fluidextractum instead of extractum fluidum, and so on.—*Alumni Report, Phila.*, 1907, v. 43, pp. 184-185.

Hoffmeister, Edward, thinks that many salutary changes have been made in the U. S. P. terminology of drugs.—*Dental Cosmos, Phila.*, 1907, v. 49, pp. 573-577.

Good, James M., calls attention to some of the official names of new remedies and the name by which they are more generally known, and says that in comparison with trade names the new names are unwieldy, not readily grasped, and they are not likely to be used.—*Pharm. Era, N. Y.*, 1907, v. 37, p. 79.

An editorial calls attention to the need of an international nomenclature because a substance is often introduced into different countries under different names and because substances have been reintroduced under a different name after having proved a failure under the original name.—*J. Am. M. Ass.*, 1907, v. 48, p. 1680.

"Gnomon" discusses the present-day practice of selling synthetic remedies under fancy names at four or more times the cost of the same substance under its proper chemical name and expresses the belief that when the consumer once becomes conversant with the facts the magic of the fancy name will count for naught.—*Pharm. J. Lond.*, 1907, v. 24, p. 456.

Beringer, George M., thinks the nomenclature and titles in the N. F. should be in harmony with the U. S. P. The titles and synonyms should also be in accordance with a uniform style or rule and in accord with modern ideas and practices.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 360.

Sharp, Gordon, makes a plea for uniformity in the nomenclature of alkaloids and their derivatives, and deprecates the present-day tendency of adopting the German names for alkaloids and their derivatives.—*Pharm. J. Lond.*, 1907, v. 25, p. 233.

"Gnomon" discusses the paper by Gordon Sharp on the desirability for uniformity in the nomenclature of alkaloids and points out that much of the trouble is doubtless due to mistranslation from the German, as the termination "ine" is not used in Germany for alkaloids and other bases, and the average translator is apt to copy the German spelling of names of chemical substances.—*Ibid.*, v. 25, p. 244.

Hannay, T., in discussing the new remedies that have been admitted to the Ph. Helv. IV points out that the now official titles appear in masquerade and cut comical figures across the page of the book. It seems a pity that instead of trional, for example, a word of 7 letters, one of 32 has to be employed, viz, "Diäthylsulfonmethy-äthylmethanum." He adds, this is certainly a long way of bridging a difficulty.—*Chem. & Drug. Lond.*, 1907, v. 71, p. 617.

The trade names are included as synonyms in the index of the Ph. Helv. IV.

An editorial discusses the nomenclature of synthetic remedies and quotes from the British Medical Journal, which suggests that in order to avoid hopeless confusion some definite agreement on nomenclature appears to be necessary. A great step would be gained if definite means were taken for bringing these alternative names before the medical profession.—*Pharm. J. Lond.*, 1907, v. 24, p. 195.

An unsigned article reviews the nomenclature and requirements for some of the newer remedies in the recently published pharmacopœias.—*Pharm. Ztg., Berl.*, 1907, v. 52, pp. 628-629.

Thomann, J., points out that the Ph. Helv. IV contains many corrections of widely used titles; thus, rhubarb is properly designated rhizoma rhei in place of radix rhei. The designation root is not used unless the preponderating portion of the drug is root.—*Schweiz. Wehnschr. f. Chem. u. Pharm., Zürich*, 1907, v. 45, p. 678.

Hill, C. A., calls attention to some of the misleading names that have been embodied in the B. P. C.—*Pharm. J. Lond.*, 1907, v. 25, p. 634.

Kebler, Lyman F., in discussing some well-known synthetics and their relations to the food and drugs act, calls attention to the fact that manufacturers frequently request permission to use some name

other than that specified, for example, "the monacetyl derivative of anilin," or the structural formula for acetanilid. It is also stated that heroine, codeine, and dionine have been used by manufacturers to avoid the odium attaching to the use of morphine and opium.—J. Am. M. Ass., 1907, v. 48, pp. 1175-1177.

Cabot, Richard C., in discussing some of the mistakes of homœopaths, points out that in naming drugs it is advisable to keep as close as we can to current usage outside the profession and cease to hold ourselves aloof. Let us call a spade a spade; let us call corrosive sublimate by its Christian name rather than by the stumps of two names like merc. corr.; when we mean charcoal, let us not call it carbo.; when we mean sulphur and oyster shells, let us say so, rather than cling to that curious relic "hepar sulph." When one means lime, why should one say calcarea?—Critic and Guide, New York, 1907, v. 8, April, p. 19.

3. COST AND SIZE.

The Pacific Pharmacist suggests that the price of the Pharmacopœia be advanced, say 50 per cent, so as to provide funds wherewith to carry on the work of revision and conduct chemical, microscopical, and other work that may be necessary.—Drug. Circ., N. Y., 1907, v. 51, p. 721.

Hill, Warren B., believes that the Pharmacopœia should be a large book, a reference book, one that could be used anywhere. Such a Pharmacopœia would be the best adapted to the needs of the country, and then, by making a syllabus or brief of it, the other purpose might be carried out also.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, p. 171.

The Committee of the Section on Pharmacology and Therapeutics of the American Medical Association, believes that the Pharmacopœia should be educational, and of such a size and form that the physician may be induced to buy and use it, or, if a large volume must be published to meet the needs of the pharmacist, it is suggested that a smaller volume should be published for the use of physicians and for the instruction of medical students. The committee also recommends the adoption of the international standards of strength for preparations of potent medicaments.—*Ibid.*, pp. 200-201.

4. PUBLICITY.

An editorial asserts that manufacturing chemical and drug houses are anxiously awaiting the delayed report of the U. S. Pharmacopœia revision committee on the suggestions and recommendations made by the committee representing the manufacturing trade of the country to the revision committee in Philadelphia last December.—Am. Druggist, N. Y., 1907, v. 50, p. 145.

The Apothecary (Boston, 1907, v. 19, p. 16) calls attention to the time required by work on the revision of the U. S. P., made necessary by the pure food and drugs act.

The Chemist and Druggist, London, is quoted as saying of the Ph. Russ. that unfortunately the pharmacopœial committee is working with bureaucratic mystery, and does not publish the results of its labors periodically, as is done in other countries. Criticism in anticipation might obviate many such errors as appear in the current work.—*Am. Druggist*, N. Y., 1907, v. 50, p. 187.

An editorial applies the comments of the Chemist and Druggist on the Ph. Russ. to that of the United States, asserts the belief that the revision committee is too large and its methods too secretive for the best results, and concludes that there is too much "bureaucratic mystery" about pharmacopœial revision.—*Ibid.*, v. 50, p. 187.

An editorial says:

We agree with the American Druggist that there is too much bureaucratic mystery about the revision of the Pharmacopœia. Full and open discussion of its labors from time to time as the work progresses, would obviate many of the errors which appear in the finished work.—*Drug Topics*, New York, 1907, v. 22, p. 82.

Remington, Joseph P., discusses the need for popularizing the Pharmacopœia and the peculiar relations held by this book growing out of its use as a legal standard.—*Am. Druggist*, N. Y., 1907, v. 50, p. 195.

5. TIME OF PUBLICATION.

An editorial points out that a serious fault which has been found with the U. S. P. is the length of time which elapses between meetings of the convention and the publication of the volumes issued under the instructions of the convention.—*Am. Druggist*, N. Y., 1907, v. 50, p. 351.

Teeters, W. J., discussing the revision of the Pharmacopœia says the work of the committee is laborious and of necessity slow. Considerable dissatisfaction exists on account of the length of time elapsing between the date of the appointment of the committee and the appearance of the book. It has been suggested from the fact that it is now the government standard, and on account of the various interests involved, that the U. S. P. should be revised by the Government. It will be remembered that at the present time the U. S. P. is the only one not revised under the direction of the Government concerned. The idea of our present method has been that the work would meet more free criticism if revised by persons not holding government authority.—*Proc. Iowa Pharm. Ass.*, 1907, p. 25.

Patton, John F., believes that the long delay in issuing the U. S. P. VIII can be obviated in the future by the convention fixing a time limit for its publication.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 488.

Jensen, P., believes the Pharmacopœia should be issued by the National Government, and says:

The woeful delay, the "messy" and generally unsatisfactory condition of the work leads me to hope that a change may be near at hand.—*Ibid.*, v. 51, p. 490.

The Pacific Pharmacist believes the Pharmacopœia should be published once in five years.—*Ibid.*, v. 51, p. 722.

6. DOSES.

Oldberg, Oscar, discusses the approximate measures used in the administration of medicines, calls attention to the variation in the approximate equivalent for tea, dessert, and table spoonful, and points out that in countries where the metric system is exclusively used full decimal quantities are always specified.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 57.

The committee on the U. S. P. of the American Medical Association asserts that the doses in the metric system are absurd mathematical equivalents and are unsuitable for practical use. The general question of dosage requires revision, as the doses given do not always represent the average doses of drugs and preparations which have a wide range from minimum to maximum.—*Pharm. J.*, Lond., 1907, v. 25, p. 197.

An editorial commenting on the official doses points out the difficulty of determining "what is the dose?"—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, p. 197.

Hoffmeister, Edward, thinks the establishment of an official average dose fills a long-felt want, when the variability in dosage as evidenced by the result obtained by different investigators is considered.—*Dental Cosmos*, Phila., 1907, v. 49, pp. 573-577.

Good, J. M., in discussing the doses of the U. S. P. VIII, expresses the belief that as designated they are rather *under* the average approximate amount specified in the text books.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 64.

Nixon, C. F., criticising the U. S. Dispensatory, remarks that the average doses of the Pharmacopœia are of no use to the pharmacist. The important thing for him is the maximum dose.—*Apothecary*, Bost., 1907, v. 19, p. 352.

Hallberg, C. S. N., points out that many of the variations that have been pointed out in the dosage of official articles is due to the fact that in the U. S. P. the attempt has been made to base the dosage of the preparations on the average dose of the drug itself. The dosage of the preparations in the Dispensatory and other similar works has always been designed without reference to the drug strength.—*Tr. Am. M. Ass. Sec. Pharm. and Therap.*, 1907, p. 174.

The Ph. Helv. IV includes a long list of maximum single and daily doses of official substances.

The Ph. Dan. VII includes a list of potent remedies giving the maximum single and the maximum daily doses.

7. ANTIDOTES.

The official antidotes adopted by the California state board of pharmacy, April 24, are reprinted.—Pacific Pharm., San Francisco, 1907-8, v. 1, pp. 146-148.

8. WEIGHTS AND MEASURES.

Oldberg, Oscar, reviews the history of weights and measures in the United States during the past fifty years and calls particular attention to their introduction in the several government medical services.—Drug. Circ. N. Y., 1907, v. 51, pp. 56-57.

The Ph. Helv. IV includes the following list of abbreviations to be used for the weights and measures used: l. = liter; dl. = deciliter; cm.³ = cubic centimeter; dm. = decimeter; cm. = centimeter; mm. = millimeter; kg. = kilogramm; g. = gramm; dg. = decigramm; cg. = centigramm; mg. = milligramm. For microscopic measurements the micro-millimeter or 1/1000 of a millimeter equals 0.501 mik.

A circular signed by M. Aristide Briand, member of public instruction, decrees the abbreviations that shall be officially used in all French educational establishments during and after 1907. In the list are the following:

Kilométer	-----	km.
Méter	-----	m.
Milliméter	-----	mm.
Kilogramme	-----	kg.
Gramme	-----	g.
Milligramme	-----	mg.
Kiloliter	-----	kl.
Liter	-----	l.
Milliliter	-----	ml.

(Chem. & Drug. Lond., 1907, v. 70, p. 109.)

An editorial note points out that the word "mil" and its derivatives "decimil" and "centimil" are included in the latest section published of the Oxford English Dictionary, thus: "Mil—Used in pharmacy for milliliter. Proposed (together with decimil for 0.0001 liter, and centimil for 0.00001 liter) by Mr. J. Humphreys (*sic*) in 1904. The three terms were authorized by the board of trade in 1905."—Pharm. J. Lond., 1907, v. 24, p. 51.

Harrison, E. F., discusses the relative value of the "mil" and the abbreviation "c. c.," to indicate the one-thousandth part of a liter, and expresses the hope that the word "mil" will be generally employed in the near future.—*Ibid.*, v. 24, p. 254.

Benoit, Rene, discusses the advantages of the metric system and outlines a plan to help forward the evolution of the use of this system

of weights and measures.—Midl. Drug. Columbus, 1906-07, v. 8, pp. 1074-1075.

An editorial in discussing weights and measures points out that a practical application of the metric system is now being made by Kynoch's Ltd. of Birmingham, England, who manufacture all kinds of things, from explosives to soap, and have adopted the metric system exclusively in the various branches of their business.—Paint, Oil and Drug Rev., Chicago, 1907, v. 43, Jan. 9, p. 9.

An editorial discusses the growing use of metric system in manufacturing industries, and points out that the only way to get the benefits of the metric system is to use it.—Drug. Circ., N. Y., 1907, v. 51, p. 523.

Stansfield, J. M., points out the desirability of directing the attention of the medical profession to the use of the metric system in prescription writing.—Proc. Florida Pharm. Ass., 1907, p. 10.

Jolley, W. A., discusses the advantages of the metric system over the present measurements used in medical prescribing and illustrates the convenience of the system by a number of practical examples.—J. Am. M. Ass., Chicago, 1907, v. 48, p. 1718.

A news note calls attention to some of the nonmetric terms still used in French drug trade, noticed in recent catalogues: Norwegian tar is quoted by the "gonne" of 52 kilos; Banyuls, Malaga, and Madeira medicinal wines by the Spanish arroba of 16 liters. British Mitcham peppermint oil is priced per English lb., no metric equivalent being given in this case.—Chem. & Drug., Lond., 1907, v. 71, p. 963.

An editorial points out that the proper way to make the metric system of weights and measures popular and its use more extensive is to acquaint the children now in school with its value and advantages. The use of the "big stick" is necessary at times, but it should be used with much discretion.—Pacific Pharm., San Francisco, 1907-08, v. 1, p. 364.

The British Food Journal (Lond., 1907, v. 9, p. 97) notes that the metric system of weights and measures has been made compulsory in Denmark, the new law, so far as the custom-house, excise, and other public authorities are concerned, taking effect three years after the ministerial decree confirming it is published. The public, however, will be permitted to use the old system for a further period of two years.

The Ph. Dan. VII includes a table giving the comparative weights and measures of the metric system, the old Danish system, the system in use in Great Britain, and the system in use in the United States.

Wilbert, M. I., points out that the use of alternative weights and measures in the National Formulary is most unfortunate and the

source of more evident and glaring errata than all of the other features combined.—*Am. J. Pharm., Phila., 1907, v. 79, p. 210.*

Beringer, George M., calls attention to the use of the word "troy" ounce in place of "apothecaries" ounce in the N. F. and the frequent occurrence of such unusual quantities as $2\frac{3}{4}$ troy ounces, $5\frac{1}{2}$ troy ounces, and $1\frac{1}{2}$ fluid ounces.—*Ibid., v. 79, p. 359.*

"Gnomon" calls attention to the variation of dram weights legal in Great Britain and points out that the only dram weight pharmacists are conversant with is a weight which should never be used except in the dispensing of medicines. The legal dram is 1:16 of the imperial ounce.—*Pharm. J. Lond., 1907, v. 24, p. 170.*

The Decimal Association presents a number of reasons why the metric system is superior to the present heterogeneous system of weights and measures now in use in Great Britain; also points out a number of inaccuracies in connection with the weights and measures now in use.—*Ibid., v. 24, p. 217.*

Riley, James, in discussing the anomalies of our weights and measures, asserts that the metric system is now in use by no fewer than 32 countries, with a population of 448,000,000 people.—*Ibid., v. 24, p. 216.*

An editorial discusses the proposed compulsory use of the metric system and points out that the metric units as a whole are no better than ours. The combined population of the 36 countries that have adopted the metric system is 445,296,000, while the combined population of the United States, Great Britain, and Russia, the countries that are not using the metric system, is 587,000,000.—*Paint, Oil, and Drug Rev., Chicago, 1907, v. 43, May 1, p. 18.*

"The International Metric System of Weights and Measures" is the title of a pamphlet published, 1906, by the U. S. Department of Commerce and Labor, Bureau of Standards, to answer some of the more simple questions that are addressed to it regarding the metric system of weights and measures. The pamphlet comprises a total of 16 pages and embodies an outline history of the metric system, an enumeration of its advantages and uses, some comparison of the several units with other weights and measures, and some reference to the present status of the international metric system in the United States.

9. OBJECT AND USES.

Whelpley, Henry M., outlines the definition of a pharmacopœia, gives some history of pharmacopœias generally, a brief history of the U. S. P., and the relation of the Pharmacopœia to the commentaries.—*Western Druggist, Chicago, 1907, v. 29, pp. 5-8.*

Hoffmeister, Edward, says that a common misconception of the scope of the Pharmacopœia consists in the belief that an official drug,

i. e., one receiving pharmacopœial recognition must necessarily be therapeutically efficient; he quotes H. C. Wood on the eligibility of brick dust to pharmacopœial recognition.—*Dental Cosmos*, Phila., 1907, pp. 573–577.

Hallberg, C. S. N., asserts that the U. S. P. is the greatest that has ever been published or issued by any of the forty-odd nations of the world. It is the most complete, most up to date, by far, of any. * * * It has never been recognized by law, except by state enactments, until this year when it was enacted a law by Congress. Because of this fact many manufacturers have studied the Pharmacopœia very carefully and found that the requirements in certain details were probably a little above that required for medicinal purposes.—*Proc. Arkansas Pharm. Ass.*, 1907, p. 28.

Good, James M., discusses the scope of the U. S. P. and calls attention to some of the changes that are embodied therein. He quotes from the preface of the fifth revision of the Pharmacopœia: "Such a work must necessarily follow in the wake of advancing knowledge; it is no part of its mission to lead in the paths of discovery. It should gather up and hoard for use what has been determined to be positive improvement without pandering to fashion or to doubtful novelties in pharmaceutical science." The present committee of revision has been controlled by the idea herein so well expressed.—*Pharm. Era.*, N. Y., 1907, v. 37, pp. 79–80.

Hatcher, Robert A., in discussing the scope of the Pharmacopœia, asserts that if we can rid the book of all useless material and fill it with all that is best, and only the best, and maintain it at that high standard of excellence, it must inevitably command the admiration and enthusiastic support of the ablest men in the profession.—*Tr. Am. M. Ass., Sec. Pharm. and Therap.*, 1907, p. 164.

The Committee of the Section of Pharmacology and Therapeutics of the American Medical Association recommends that the Pharmacopœia should not be a scientific and historical bibliography of all the antiquated drugs once found to be useful, or even now thought to be valuable in some parts of the United States, but should represent the science and belief of the day when it was printed. Hence, many drugs of the same therapeutic class might be deleted without preventing physicians from ordering them if they pleased.—*Ibid.*, pp. 200–201.

A news item calls attention to the report of the committee appointed by the American Medical Association to make suggestions for the improvement of the U. S. P., and agrees that the recommendations of the committee appear to be reasonable and practical.—*Pharm. J.*, Lond., 1907, v. 25, p. 197.

Remington, Joseph P., points out that the U. S. P. is made for the United States of North America, and that it is more important that the Pharmacopœia be recognized as an authority and used by the

country doctor who is not a professor in a medical college than by a professor in a college, because the professor knows more of the study of pharmacology than the country doctor.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, p. 170.

Hatcher, Robert A., points out that while it is true that the Pharmacopœia must serve a diversity of interests, all of which are represented in the direction of its affairs, it is also true that if we are to strive only for the best we shall be forced to do some violence to the ideas of those who through sloth, incompetence, or misfortune are unable to keep step with the march of therapeutic progress.—*Ibid.*, p. 165.

Wilbert, M. I., believes that the U. S. P. should be restricted to drugs that are used in all parts of the United States and should not include drugs used only in one particular section. He points out that if drugs that are not widely used can be demonstrated to have advantages, they will soon be more widely used and will then be eligible for inclusion in the Pharmacopœia.—*Ibid.*, p. 173.

Kraemer, Henry, is pleased to learn that physicians are willing to agree to the fundamental principle enunciated by Dr. Charles Rice, that the members of the medical profession should select the substances which enter into the Pharmacopœia, and that the pharmaceutical profession should provide the descriptions of these substances.—*Ibid.*, p. 174.

Robinson, William J., in discussing the scope of the Pharmacopœia points out that if one book will not do for both pharmacist and physician, then a special abstract should be made for the physician's use.—*Ibid.*, p. 171.

Wilbert, M. I., called attention to the work of Charles Rice and his influence upon the Pharmacopœia, which was changed from a mediocre list of drugs to a truly representative Pharmacopœia largely through his efforts.—J. Am. M. Ass., 1907, v. 49, pp. 1659-1661.

The Druggists' Circular presents the opinions of a number of pharmacists, physicians, and chemists who have responded to its invitation to comment on the subject of a government Pharmacopœia mentioned editorially in.—Drug. Circ., N. Y., 1907, v. 51, p. 487.

An editorial expresses the opinion that the agitation of a possible transfer of the U. S. P. from its present source of inspiration to a federal commission or some other government body is in a large measure ill advised and that the change would be a distinct step backward in the pharmaceutical world.—Pharm. Era., N. Y., 1907, v. 37, p. 145.

Grimbert, L., under the title of "La thérapeutique jugée par les chiffres," gives an interesting ten years' summary of therapeutic progress.—J. de pharm. et de chim., 1907, v. 26, pp. 353-361.

Hommell, P. E., presents a number of suggestions for admissions to the U. S. P.—Proc. New Jersey Pharm. Ass., 1907, p. 62.

10. ADDITIONS AND DELETIONS.

Wulling, Frederick J., calls attention to the list of additions and corrections, and points out that some of the changes in requirements are of considerable importance and apply in a large degree to the assay processes and requirements of potent drugs.—Proc. Minnesota Pharm. Ass., 1907, p. 33.

Blome, Walter H., thinks that some of the additions and corrections adopted by the revision committee ought to have been unnecessary, and adds: "Surely such constants as melting point and solubility have not changed."—Proc. Michigan Pharm. Ass., 1907, p. 65.

Hallberg, C. S. N., in discussing the additions and corrections to the U. S. P. VIII, says: "The changes, as far as the pharmacists are concerned, amount to little, the most important thing being that while there are slight reductions in the alkaloidal strengths of drugs, and their preparations, these changes will make the pharmacopœial standards more easily enforced."—Proc. Arkansas Pharm. Ass., 1907, p. 28.

Schultze, Louis, asserts that none of the corrections of the U. S. P. VIII are of particular interest of themselves, nor do they indicate a deviation on the part of the committee from the high ideal they have followed in the compilation of the Pharmacopœia.—Proc. Maryland Pharm. Ass., 1907, p. 43.

Whelpley, H. M., asserts that the additions and corrections to the U. S. P. VIII are of very little importance to the retail pharmacist and do not necessitate the buying of a new Pharmacopœia. A folder of 6 pages, containing all of the corrections and additions, may be obtained from the selling agents of the U. S. P. at the expense of a 2-cent stamp.—Proc. Arkansas Pharm. Ass., 1907, p. 68.

An editorial points out that it is important that every owner of a Pharmacopœia secure a copy of the leaflets containing the additions and corrections, and note the changes in the U. S. P. VIII, so that he may guard against possible serious error.—Nat. Druggist, St. Louis, 1907, v. 37, p. 160.

Beringer and White in calling attention to the additions and corrections of the U. S. P. VIII, regret that the committee on revision did not have these printed only on one side of the paper, thus saving considerable time necessary to properly note the corrections.—Proc. New Jersey Pharm. Ass., 1907, p. 130.

An editorial commenting on the supplementary list of additions and corrections to the U. S. P., says that the finding of so many errors or omissions in the volume so soon after its publication is not calculated to inspire that degree of confidence which all pharmacists should feel for the legally adopted standard for the preparations named therein.—Nat. Druggist, St. Louis, 1907, v. 37, p. 227.

Squires, G. Brenton, thinks that as nitrous oxide is used more extensively in the dental profession than is ether in the medical profession, it should be made official, so that the dental practitioner may be protected by a standard of purity, etc. Some form of magnesium hydroxide should be made official. Sodium dioxide, trioxymethylene, and other agents used more or less extensively by dentists should be included. Certain peroxide compounds, such as calcium dioxide, strontium dioxide, sodium perborate, and others that give off oxygen when brought in contact with water are being used in tooth powders. The advisability of introducing any of these into the Pharmacopœia should be investigated and decided to a certain extent by dentists.—Dental Cosmos, Phila., 1907, v. 49, p. 845.

Hatcher, Robert A., recommends the deletion of many useless substances which have been retained wholly out of deference to the sentiments of a goodly number of very respectable but not progressive practitioners who use the remedies which their honored preceptors used before them without any definite idea of just what they expect to accomplish thereby.—Tr. Am. M. Ass., Sec., Pharm. and Therap., 1907, p. 165.

11. PURITY AND STRENGTH.

Blome, Walter H., expresses the opinion that it is unfortunate that the revision committee saw fit to impose such very, and in many cases unnecessarily, high standards for drugs and chemicals intended for medicinal use. For chemical purposes the best and purest chemicals are very necessary, but such purity is not demanded for medicinal purposes. Indeed, he thinks, the revision committee has apparently come to the conclusion that some of the demands of the Pharmacopœia as regards purity are unreasonable, and for that reason has reduced the rigidity of the tests to be applied for the examination of such products.—Proc. Michigan Pharm. Ass., 1907, p. 65.

An unsigned article enumerates the chemical substances that are obtainable in three grades, either technical, U. S. P., or C. P.—Drug Topics, New York, 1907, v. 22, p. 25.

The N. W. D. A. committee on standards and tests suggests that the advantages of the cooperation of the Government and its resources may be secured by enlisting the services of the United States consuls through the Department of Commerce in collecting samples and information from all parts of the world, and by utilizing the government laboratories for confirming the tests suggested by the committee on revision of the Pharmacopœia.—Am. Druggist, N. Y., 1907, v. 51, p. 256.

Francis, John M., points out that the specifications of the U. S. P., 1890, were in a large measure absolutely impracticable, and that the

U. S. P. VIII is a very great improvement on its predecessor, as the revision committee paid more heed to the practical processes in manufacturing lines. But even these standards were in many cases too severe and some wholly impossible.—Proc. Pennsylvania Pharm. Ass., 1907, p. 64.

A table showing the drug strength of preparations, the required per cent of alkaloid in standardized drugs, and the per cent strength of the preparations compared with the drug as 100, both in the original edition of the U. S. P. VIII and the same standards corrected to June 1, 1909, is appended.

TABLE OF PERCENTAGE STRENGTH.

Adapted from tables presented by Frank X Moerk.—Proc. Pennsylvania Pharm. Ass., 1906, pp. 157-158:

Names of drugs and preparations.	Grams of drugs in 100 cc of the preparations.	Required percentage of alkaloid (in case of liquids, grams in 100 cc U. S. P. VIII (original).	Percentage strength of the preparations compared with the drug as 100.	Required percentage of alkaloid (in case of liquids, grams in 100 cc) corrected to June 1, 1907.	Percentage strength of the preparations compared with the drug.
Aconite.....		0.5.....	100.0	0.5.....	100.0
Fluid extract.....	100	0.4.....	80.0	0.4.....	80.0
Tincture.....	10	0.045.....	9.0	0.045.....	9.0
Belladonna leaves.....		0.35.....	100.0	0.3.....	100.0
Extract.....		1.4.....	400.0	1.4.....	466.6
Tincture.....	10	0.035.....	10.0	0.03.....	10.0
Plaster.....		0.38-0.42.....		0.38-0.42.....	
Belladonna root.....		0.5.....	100.0	0.45.....	100.0
Fluid extract.....	100	0.5.....	100.0	0.4.....	88.8
Cinchona.....		5 total.....		5 total.....	
Cinchona.....		4 ether-sol.....	100.0	4 ether-sol.....	100.0
Fluid extract.....	100	4 ether-sol.....	100.0	4 ether-sol.....	100.0
Tincture.....	20	0.75 ether-sol.....	18.75	0.75 ether-sol.....	18.75
Coca.....		0.5 ether-sol.....	100.0	0.5 ether-sol.....	100.0
Fluid extract.....	100	0.5 ether-sol.....	100.0	0.5 ether-sol.....	100.0
Colchicum corn.....		0.35.....	100.0	0.35.....	100.0
Extract.....		1.4.....	400.0	1.4.....	400.0
Colchicum seed.....		0.55.....	100.0	0.45.....	100.0
Fluid extract.....	100	0.5.....	91.0	0.4.....	88.8
Tincture.....	10	0.05.....	9.1	0.04.....	8.8
Conium.....		0.5.....	100.0	0.5.....	100.0
Fluid extract.....	100	0.45.....	90.0	0.45.....	90.0
Guarana.....		3.5.....	100.0	3.5.....	100.0
Fluid extract.....	100	3.5.....	100.0	3.5.....	100.0
Hydrastis.....		2.5 hydrastine.....	100.0	2.5 hydrastine.....	100.0
Fluid extract.....	100	2 hydrastine.....	80.0	2 hydrastine.....	80.0
Tincture.....	20	0.4 hydrastine.....	16.0	0.4 hydrastine.....	16.0
Hyoscyamus.....		0.08.....	100.0	0.08.....	100.0
Extract.....		0.3.....	375.0	0.30.....	375.0
Fluid extract.....	100	0.075.....	93.75	0.075.....	93.75
Tincture.....	10	0.007.....	8.75	0.007.....	8.75
Ipecac.....		2.....	100.0	1.75.....	100.0
Fluid extract.....	100	1.75.....	87.5	1.50.....	85.75
Nux vomica.....		1.25 strychnine.....	100.0	1.25 strychnine.....	100.0
Extract.....		5 strychnine.....	400.0	5 strychnine.....	400.0
Fluid extract.....	100	1 strychnine.....	80.0	1 strychnine.....	80.0
Tincture.....	(2 extr.)	0.1 strychnine.....	8.0	0.10 strychnine.....	8.0
Opium gum.....		9 morphine.....	75.0	9 morphine.....	75.0
Granulated.....		12-12.5 mor- phine.....	100.0	12-12.5 mor- phine.....	100.0
Tincture.....	10	1.2-1.25 mor- phine.....	10.0	1.2-1.25 mor- phine.....	10.0
Deod. tincture.....	10	1.2-1.25 mor- phine.....	10.0	1.2-1.25 mor- phine.....	10.0
Powdered.....		12-12.5 mor- phine.....	100.0	12-12.5 mor- phine.....	100.0
Deodorized.....		12-12.5 mor- phine.....	100.0	12-12.5 mor- phine.....	100.0
Extract.....		20 morphine.....	160.0	20 morphine.....	160.0
Opium extract in course of preparation.....	50 in 100 grams.		200.0		

Names of drugs and preparations.	Grams of drugs in 100 cc of the preparations.	Required percentage of alkaloid (in case of liquids, grams in 100 cc U. S. P. VIII (original).	Percentage strength of the preparations compared with the drug as 100.	Required percentage of alkaloid (in case of liquids, grams in 100 cc) corrected to June 1, 1907.	Percentage strength of the preparations compared with the drug.
Physostigma.....	.....	0.15 ether sol....	100.0	0.15 ether sol....	100.0
Extract.....	.....	2 ether sol.....	1333.3	2 ether sol.....	1333.3
Tincture.....	10	0.014 ether sol....	9.3	0.014 ether sol....	9.3
Pilocarpus.....	.....	0.5.....	100.0	0.5.....	100.0
Fluid extract.....	100	0.4.....	80.0	0.4.....	80.0
Scopolia.....	.....	0.5.....	100.0	0.5.....	100.0
Extract.....	.....	2.....	400.0	2.....	400.0
Fluid extract.....	100	0.5.....	100.0	0.5.....	100.0
Stramonium.....	.....	0.35.....	100.0	0.25.....	100.0
Extract.....	.....	1.4.....	400.0	1.....	400.0
Fluid extract.....	100	0.35.....	100.0	0.25.....	100.0
Tincture.....	10	0.03.....	8.6	0.025.....	10.0

An editorial points out that standards that have been set for crude drugs by the present committee of revision were impracticable since drugs of pharmacopœial quality could not be obtained in the quantities needed to supply the demand.—*Am. Druggist*, N. Y., 1907, v. 50, p. 351.

An editorial discusses the effect of the reduction of the U. S. P. standards, and points out that the list as published must be regarded as a substantial victory for the drug importers who protested that the U. S. P. VIII standards for certain drugs were demanding an impossibility.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 123.

Whelpley, H. M., in discussing the additions and corrections to the U. S. P. VIII, points out that they are merely a few changes that concern the manufacturing pharmacists where it has been pointed out that in spite of all care in revising the Pharmacopœia, in a few instances, chemical standards were too high for the manufacturer to comply with. These have been changed so that the chemicals that the pharmacists are now selling will comply with the pure food and drugs law.—*Proc. Arkansas Pharm. Ass.*, 1907, p. 65.

Southall, A. W., in discussing the purity of medicaments points out that the more care the pharmacist takes in regard to the purity of his chemicals and the standardization of his preparations, the more will medical men have confidence in him, and he may rest assured that this confidence will also be shared by the public.—*Pharm. J. Lond.*, 1907, v. 25, pp. 637, 638.

Bernegau, Henry, discusses some of the official standards and tests.—*Am. J. Pharm.*, Phila., 1907, v. 79, pp. 553–556.

12. ATOMIC WEIGHTS.

Dohme, A. R. L., discusses the differences of opinion that have prevailed regarding the desirability of having H=1 or O=16 as the basis of atomic weights, and points out that after eight years of constant strife the majority of the atomic weight commission has finally decided to adopt O=16 as the basis for future work.—*D. -A. Apoth. -Ztg.*, N. Y., 1907, v. 28, p. 147.

Remington, Joseph P., referring to atomic weights says that it is generally known that the value of some of the atomic weights are still matters of controversy, especially in Europe, and it is likely that this controversy will be continued for years before it is settled.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 90.

Clarke, F. W., presents the report of the international committee on atomic weights with the table offered for 1907.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 107–111.

The fourteenth annual report of the committee, with the determinations published during 1906, is given.—*Ibid.*, v. 29, pp. 249–262. (See also other chemical journals.)

Richards, Theodore Williams, discusses atomic weights and the factors that must be considered in their determination. These factors he enumerates as: 1. A suitable substance of absolute purity. 2. The combination apart from the substance to be studied can contain only elements of fixed atomic weight. 3. The valence of the several substances must be well defined and fixed. 4. The selected substance must be well suited to assay and its synthesis from weighed portions of constituents possible.—*Ber. d. deutsch. chem. Gesellsch.*, 1907, v. 40, III, pp. 2767–2779.

Erdmann, H., points out the uncertainty in connection with the present international atomic weight table and calls attention to the need for agreeing, for all practical purposes, on the adoption of a table for a period of at least five years.—*Chem. Ztg.*, Cöthen, 1907, v. 40, pp. 95–96.

Brauner, Bohuslav, discusses the development of the atomic theory of Dalton and reviews some of the work that has been done in connection with the determination of atomic weight.—*Ibid.*, v. 31, pp. 483–485.

Watson, H. E. (Univ. Coll., Gower St., Nature, 77, 7) presents a study on the recalculation of atomic weights.—*Chem Abstr. Am. Chem. Soc.*, 1908, v. 2, p. 948.

Thomann, J., points out that the atomic weights in the Ph. Helv. IV are based on the international atomic weight table O=16.—*Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich*, 1907, v. 45, p. 750.

The Ph. Dan. VII gives a table of atomic weights based on the international atomic weight table of 1907—O=16.00 and H=1.008.

Oldberg, Oscar, discusses the importance of a true conception and expression of atomic combining values, and concludes that our common understanding of valence is incomplete and inadequate, and that units of combining value must be counted algebraically, designating the units of hydrogen valence as minus values and those of oxygen valence as plus values in order to bring out their true and full meaning.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 401–419.

For additional references on atomic weights see Chemical Abstracts.

13. CHEMICAL FORMULAS.

The Ph. Helv. IV includes chemical formulas only in connection with volumetric solutions, not in connection with the official descriptions of chemicals.

The Ph. Dan. VII includes chemical formulas as a portion of the official title.

3. NONPHARMACOPŒIAL STANDARDS.

1. NATIONAL FORMULARY.

An editorial points out that many practically minded pharmacists frequently suggest the practicability of combining the U. S. P. and the N. F., and the editor ventures the opinion that in time such a union of the two works may take place.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 415.

Lilly, J. K., believes that the National Formulary should be abolished, and thinks that the Pharmacopœia should eventually be a government publication, especially if it is to remain the standard or basis for the federal drugs act.—Drug. Circ., N. Y., 1907, v. 51, p. 561.

Stansfield, J. M., thinks the various formulæ of the National Formulary are on probation and if they stand the test of time will be transferred to the U. S. P. He also thinks that at least some of them are old enough and of sufficient merit to be "translated at once."—Proc. Florida Pharm. Ass., 1907, p. 10.

Whitney, D. V., presents a review of the National Formulary and calls attention to some of the changes that are embodied in that book.—Proc. Missouri Pharm. Ass., 1907, pp. 149-151.

Hommell, P. E., asserts that the National Formulary as it now appears is quite acceptable and contains formulas for elegant, palatable, and official remedies, which, when properly exhibited, will yield good results.—Proc. New Jersey Pharm. Ass., 1907, p. 17.

Diehl, C. Lewis, points out that the interest in the N. F. awakened by its inclusion in the food and drugs act has aroused interest that has manifested itself in part in numerous and, in some instances, harsh criticisms, but in the main the N. F., now that it has acquired the distinction of an authoritative standard, has been accepted with favor by both professions.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 69.

Thrush, M. C., presents some notes on the N. F. III and points out that "preparations are first introduced into the National Formulary through the committee appointed by the American Pharmaceutical Association, and, if they prove satisfactory and become popular with the physicians, they are then added to the Pharmacopœia at a future revision."—P. C. P. Alumni Report, Phila., 1907, v. 43, p. 186.

Wilbert, M. I., discusses the scope and shortcomings of the National Formulary, reviews some of its history, and points out that the recognition of this book as a standard under the food and drugs act

gives to it a standing quite different from that intended for it by the original compilers.—*Am. J. Pharm., Phila.*, 1907, v. 79, pp. 205-212.

Beringer, George M., discusses the National Formulary as a legal standard and points out some of its defects. He particularly deplores the desire of the authors to extend the work beyond reasonable bounds.—*Ibid.*, v. 79, pp. 357-365.

Scoville, Wilbur L., points out that the provisions of the food and drugs act of June 30, 1906, make it a misdemeanor to change the formula of any pharmacopœial or National Formulary preparation in any way without stating the deviation on the label of the preparation. This fact makes slight imperfections in the formulas of greater importance than ever before, and it is therefore to the interest of pharmacists that all formulas in these works be as universally acceptable as it is possible to have them.—*Drug. Circ., N. Y.*, 1907, v. 51, pp. 294-295.

Good, James M., reviews the National Formulary and discusses some of the preparations.—*Meyer Bros., Drug., St. Louis*, 1907, v. 28, p. 131.

Diehl, C. Lewis, discusses the nomenclature of compound preparations in the National Formulary and points out that the objections made by Kebler are not well founded.—*Bull. Am. Pharm. Ass., Chicago*, 1907, v. 2, pp. 80-82.

A discussion relating to the use of the National Formulary text in commentaries and similar books is reprinted.—*Ibid.*, v. 2, p. 7.

An editorial commenting on the restriction of the use of the text of the National Formulary expresses the belief that the American Pharmaceutical Association would be rendering a greater service to pharmacy by putting the text at the disposal of any dispensatory maker who would agree to comment upon it.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 248.

The report of the meeting of the Chicago Branch of the American Pharmaceutical Association contains a number of improved formulas for pharmacopœial and National Formulary preparations.—*Am. Druggist, N. Y.*, 1907, v. 51, p. 394.

An editorial discusses some recent comments on criticisms of the National Formulary, and points out that good healthy criticism never did anybody any harm, and that it is most important that pharmacists should be made aware of any defects that may exist in the book. Moreover, it is right that this information should be placed before them, and in as public a manner as is possible.—*Ibid.*, v. 51, p. 131.

Ferrel, O. L., presents some comments on the National Formulary.—*Proc. Texas Pharm. Ass.*, 1907, pp. 73-74.

McKee, E. S., calls attention to the needs for pharmacists studying the N. F. III, and records some of his experience.—*Meyer Bros. Drug., St. Louis*, 1907, v. 28, p. 7.*

An editorial discusses the object and the uses of the National Formulary and points out the need for pharmacists becoming acquainted with the object and the contents of this book.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 341.

Thomas, D. J., expresses the belief that the rank and file of pharmacists are not prepared to meet the demands for U. S. P. and N. F. preparations.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 296.

Wilbert, M. I., recalls that the late Charles Rice, the chairman of the first Committee on National Formulary, objected to the inclusion of formulas for preparations equivalent to well-known proprietaries, and points out that on this question there was still a decided difference of opinion.—*Ibid.*, v. 79, p. 244.

Good, James M., points out that the insertion of superfluous or less-desirable formulas is due to the fact that the work is to include all preparations for which there is a reasonable demand. The excuse for inserting these is that "physicians want them."—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 131.

Hatcher, Robert A., points out that the argument that it is necessary to have authoritative standards for many articles in domestic use has lost much of its force, so far as it applies to the Pharmacopœia, since the National Formulary has been clothed with legal authority, and that work should relieve the Pharmacopœia of this hindrance to its upward progress.—*Tr. Am. M. Ass. Sec., Pharm. and Therap.*, 1907, p. 165.

The changes and corrections that have been adopted for the National Formulary are reprinted.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, pp. 155–158. (See also other drug journals.)

Caldwell, Paul, presents a list of National Formulary preparations and the approximate percentage of alcohol contained in each of the alcohol-containing compounds.—*Drug. Circ.*, N. Y., 1907, v. 51, pp. 202–206.

A number of formulas from the addendum of the Ph. Austr. VIII are reprinted.—*Pharm. J. Lond.*, 1907, v. 24, p. 25.

"M. P. S." presents a number of formulas from a pamphlet entitled "Prescriptiones Viennenses" for compound pharmaceuticals to replace some of the many proprietary preparations now sold in Austria.—*Ibid.*, v. 24, pp. 103–104.

Gadd, H. Wippell, believes that the multiplicity of formulas in the B. P. C. is confusing and that it would be very difficult indeed for a physician to steer his way through this maze of closely related formulas and be able to specify in a manner intelligible to a dispenser what he really wants.—*Brit. and Col. Drug. Lond.*, 1907, v. 52, p. 389.

F. I. D., 59, announces that the formulas in the appendix of the National Formulary are not to be construed as being a part of that

book; such articles, however, are subject to the law in every other respect, such as is the case of products not recognized by the U. S. P. or the N. F.

2. NEW AND NONOFFICIAL REMEDIES.

The Council on Pharmacy and Chemistry describes a number of new and nonofficial remedies.—*J. Am. M. Ass.*, 1907, v. 48, pp. 51, 141, 227, 329, 421, 523, 611, 697, 797, 877, 948, 1031, 1109, 1185, 1351, 1866.

Sadtler, Samuel P., discusses the work of the Council on Pharmacy and chemistry of the American Medical Association and the conditions prevailing at the time of its formation.—*Am. J. Pharm., Phila.*, 1907, v. 79, pp. 22–28.

Schultze, Louis, asserts that the work of the Council on Pharmacy and Chemistry of the American Medical Association has proved itself a factor worthy of consideration in the present readjustment of pharmaceutical conditions. It has fearlessly attacked the sham preparation of whatever origin, and is thereby contributing largely to the realization of "ethical pharmacy."—*Proc. Maryland Pharm. Ass.*, 1907, p. 44.

Stengel, Alfred, in discussing the work done by the Council on Pharmacy and Chemistry, pointed out that while physicians had been remiss in allowing themselves to be imposed upon by detail men, pharmacists had also been remiss in not keeping physicians informed of the misleading statements that were being made in connection with many supposedly new remedies.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 46.

Thum, John K., in discussing the work of the Council on Pharmacy and Chemistry, asserts that the work of the council has resulted in a more widespread interest on the part of physicians in the Pharmacopœia and the National Formulary and that this alone should secure for it the unqualified indorsement and support of pharmacists.—*Ibid.*, v. 34, pp. 34–35.

Remington, Joseph P., is quoted as asserting that the American Medical Association during the past year has done a great service in pointing out the nonsecret and ethical preparations, and he congratulates it on behalf of the American Pharmaceutical Association for the good work it has done.—*Merck's Arch.*, N. Y., 1907, v. 9, p. 372.

An editorial discusses the work of the Council on Pharmacy and Chemistry of the American Medical Association and announces the first publication of N. N. R.—*Pharm. J. Lond.*, 1907, v. 24, p. 487.

NEW REMEDIES.

Simmons, George H., discusses the "Commercial domination of therapeutics and the movement for reform," tracing the rise of the nostrum evil and the efforts of the American Medical Association to

cope with it through the Council on Pharmacy and Chemistry.—*J. Am. M. Ass.*, 1907, v. 48, pp. 1645–1653.

Hynson, Henry P., traces the use of proprietaries by physicians during the previous fifty years. He discusses their uncertainty, unreliability, and pretended originality and other objections to them and states that the remedy is to be found in mutual help from the physician and the pharmacist.—*Ibid.*, v. 48, pp. 1243–1245.

Bok, Edward, discusses the “Physician and the nostrum.”—*Ibid.*, v. 48, pp. 688–691.

The committee on new remedies discusses some of the new remedies introduced during the year and presents an alphabetical list of these remedies.—*Proc. New York Pharm. Ass.*, 1907, p. 247–261.

Robinson, Beverly, discusses the widespread use of proprietary medicines and emphasizes the opinion that nearly all proprietary medicines are mysterious and that at least some are humbugs.—*Med. Rec.*, N. Y., 1907, v. 71, pp. 141–142.

An editorial calls attention to the confusion in nomenclature regarding new remedies and the efforts which are being made to apply group suffixes indicative of the action.—*Brit. M. J.*, 1907, v. 1, p. 398.

Zernik, F., reviews the more important new remedies of 1906 and again calls attention to the evident need for an impartial testing of all new remedies before they are permitted to be exploited for general use.—*Ber. d. pharm. Gesellsch.*, Berl., 1907, v. 17, pp. 81–102.

Rabow, S., reviews the new remedies introduced during the year 1906 and presents a table in which these remedies are arranged according to their reputed therapeutic indications.—*Chem. Ztg.*, Cöthen, 1907, v. 31, pp. 154–159, 172–173, 203–204, 265–268.

Lüders, Richard, reviews the advances in pharmaceutical chemistry and discusses the new remedies introduced in the year 1906, classifying them under their physiological or therapeutic uses.—*Chem. Ind.*, Ber., 1907, v. 30, pp. 354–363, 390–397.

Riedel's Mentor (Berlin, 1907, pp. 79–125) presents a list of newer remedies with some indication as to their composition.

LaWall, Charles H., discusses the effect of publicity on the standing and use of new and nonofficial remedies.—*Am. J. Pharm.*, Phila., 1907, v. 79, pp. 29–33.

An editorial discusses the multiplication of names as trade-marks for individual chemical substances.—*Am. Druggist*, N. Y., 1907, v. 50, p. 128.

Solis-Cohen, S., discusses the “Limits of proprietorship in materia medica, how far necessary, how far permissible, and how controllable.”—*J. Am. M. Ass.*, 1907, v. 48, pp. 195–198.

Horlick, A. J., in the report of the committee on trade-marks, reviews the regulations that are enforced in many of the foreign countries.—*Proc. N. W. D. A.*, 1907, 33rd Ann. Meet., pp. 123–143.

Leverett, J., discusses several questions pertaining to the use of the Pharmacopœia by physicians, and the reasons for the use of non-official remedies in the practice of medicine.—N. York M. J., 1907, v. 85, p. 858.

SYNTHETICS.

Wainwright, J. W., discusses the development of chemical synthesis as applied in the production of remedial agents.—Med. Rec., N. Y., 1907, v. 72, pp. 678–682.

Schweitzer, Hugo, presents an interesting historical memoir bearing on the accidental discoveries of chemistry.—Am. Druggist, N. Y., 1907, v. 50, pp. 192–194.

Kebler, Lyman F., discusses the relation of some of the well-known synthetic chemicals to the pure food and drugs act.—J. Frankl. Inst., Phila., 1907, v. 163, pp. 303–310.

Gösling, W., reviews the evolution of the synthesis of medicinal substances, the rapid growth in importance of chemistry, and the nature and composition of the more widely used antipyretics which he classes as being related to or substitutes for the three typical combinations of pyrazalon, aniline and para amidophenol, antipyrine, acetanilide, and phenacetin.—Apoth. Ztg., Ber., 1907, v. 22, p. 741.

4. ANALYTICAL DATA.

1. ADULTERATIONS.

Vanderkleed, Charles E., in discussing the adulteration of drugs points out that the term “adulteration” has come to possess a secondary and broader sense, including therein the meaning of “inferiority,” whether produced intentionally or as a result of what may be styled, for lack of a better expression, “natural causes.” He points out that the law of supply and demand knows no exceptions, and so long as there are customers who will not pay the cost of first-class drugs there will be found plenty of dealers who will supply inferior drugs at lower prices.—Proc. Pennsylvania Pharm. Ass., 1907, p. 56.

Southall, A. W., in discussing the purity of chemicals points out that the dictionary definition for the word purity is “free from all heterogeneous or extraneous matter,” and also points out that chemicals are offered in varying degrees of purity, according to what it is intended to use them for. Generally speaking, we are continually finding out certain impurities in very small quantities in chemicals.—Chem. & Drug., Lond., 1907, v. 71, p. 765.

Hankey, William T., in discussing the frequent adulteration of chemicals points out the need for careful and conscientious laboratory control; even samples sent out guaranteed under the food and

drugs act will not always comply with the requirements made of them.—Proc. Pennsylvania Pharm. Ass., 1907, p. 72.

Good, James M., thinks that chemicals should be *medicinally* pure, not necessarily *chemically* pure. The latter is necessary only in preparing chemical reagents. Absolute purity (that is perfection) is difficult of attainment in any direction or in any matter.—Nat. Druggist, St. Louis, 1907, v. 37, p. 64.

Bryant, Joseph D., said, in discussing the need of honest drugs, that a recent report to the New York board of health shows that a number of drugs were found to vary widely from the official requirement.—J. Am. M. Ass., 1907, v. 48, p. 1913.

An editorial calls attention to the annual report of the local government board for England and Wales and presents some interesting data on the adulteration of drugs and medicinal substances. A table giving the number of samples examined and the number found adulterated or not up to the standard is reproduced.—Chem. & Drug., Lond., 1907, v. 71, p. 828.

2. REAGENTS.

The Ph. Helv. IV includes a comprehensive list of reagents, volumetric solutions, indicators, and reagents for use in connection with clinical work.

The Ph. Dan. VII presents tabulated lists of reagents, volumetric solutions, and of the necessary apparatus to apply the official tests.

Coblentz, Virgil, asserts that the U. S. P. tests are nearly all as perfect as our present knowledge of science can make them and represent the result of many years of experience.—Pharm. Era., N. Y., 1907, v. 37, p. 95.

Murray, Benjamin L., points out that an evident defect of the U. S. P. VIII is the unnecessary multiplication of tests for chemical substances.—Merck's Report, N. Y., 1907, v. 16, p. 248.

Whelpley, H. M., asserts that our Pharmacopœia differs from many others in giving chemical tests that can be followed by pharmacists who have limited laboratory facilities.—Proc. Arkansas Pharm. Ass., 1907, p. 66.

Wulling, Frederick J., calls attention to the need for adding a set of reagents and the necessary apparatus for applying the several pharmacopœial tests to the equipment of the pharmacist. He believes that this is not alone desirable but an actual necessity as a means of self-defense.—Proc. Minnesota Pharm. Ass., 1907, p. 34.

White, Edmund, presents a series of articles dealing with the reagents in frequent demand for analytical purposes, and discusses the trade varieties of the several compounds indicating what may be expected of the ordinary or technical varieties met with in trade.—Pharm. J., Lond., 1907, v. 24, p. 404. (See also v. 25, p. 104.)

v. Waldheim, Max, presents a compilation of reagents and reactions arranged alphabetically according to the author's name. The compilation appears as a supplement to "Pharmazeutische Praxis" for 1907, and is paged separately.

3. INDICATORS.

Rupp and Seegers assert that phenolphthalein, being a slowly dissociated indicator acid, does not readily respond to the influence of weak bases like ammonia and the alkaloids, and that for these substances indicators more sensitive to weak alkalies must be used. They discuss the composition of several phenolphthalein compounds and their possible uses as indicators.—Apoth. Ztg., Berl., 1907, v. 22, pp. 748-750.

Margosches, B. M., presents some observations on the alkali salts of phenolphthalein and on the behavior of phenolphthalein to alkaline solutions of high concentration, and shows that with an excess of highly concentrated alkali solution colorless alkali combinations of phenolphthalein are formed.—Ztschr. f. ang. Chem., Berl., 1907, v. 20, pp. 181-191, 226-231.

Rohland, P. (Techn. Hochschule, Stuttgart, Ber., 40, 2172-2174), states that according to the chromophoric theory, the decolorization of phenolphthalein depends on the formation of a lactone ring, although some authors state that it depends on the resolution of this complex. In any case, the regeneration of the color by diluting a strongly alkaline solution tells against this theory. Similar difficulties are met with in the case of methyl orange. On the other hand, all the facts are in harmony with the idea that the negative ion of phenolphthalein is red and the undissociated compound colorless, whereas the methyl orange ion is yellow and the undissociated compound red. Moreover, the ionic theory is in harmony with the law of mass action.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2586.

Aymerich, J. Prats (An. Soc. Espan. fis. y quim. mars., 1907), thinks Congo red as an indicator, in the form of a solution or of reagent paper, is highly to be recommended for strong bases and acids, and always preferable to methyl orange.—Répert. de pharm. Par., 1907, v. 19, p. 316.

For certain weak acids, not diluted (with the exception of boric and phenic acids), Congo paper serves better, especially in the tincture industry, the two colors, blue (with acids) and red (with alkalies) are much more distinct and differentiable than the corresponding colors and changes obtained with tournesol.—*Ibid.*, v. 19, p. 316.

Chrysoidine, in spite of its extraordinary sensitiveness for strong acids, is not convenient of application in the appreciation of the change from yellow (color of the neutral or alkaline solution) to orange.—*Ibid.*, v. 19, p. 316.

4. PHYSICAL CONSTANTS.

Seidell, Atherton, points out that many of the statements regarding physical constants of chemical compounds are based upon inaccurate or careless determinations and are therefore incorrect and misleading. This is particularly true of solubility determinations.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 469-478.

Thomann, J., points out that physical constants—specific gravity, melting point and boiling point—are important indications of the identity or purity of chemical substances.—Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 715.

Bingham, E. C., has tested the miscibility or immiscibility of a large number of pairs of liquids and finds that substances of small molecular volume are often immiscible with other substances of large molecular volume. He points out that the presence of small amounts of water may often account for the immiscibility of substances. The possibility of utilizing this fact in obtaining a test for dehydration is suggested.—Am. Chem. J., 1907, v. 37, pp. 549-557.

In a second paper he goes into the subject extensively and gives tabulated statements of his results.—*Ibid.*, v. 38, pp. 91-118.

SPECIFIC GRAVITY.

The Ph. Helv. IV directs that, unless otherwise specified, specific gravity is to be determined at 15° C.

Philipp Röder (Jahresbericht, Wien, 1907, p. 11) points out that specific gravity of liquids is usually best determined by means of the Westphal balance, and it is only with volatile, fuming, and dense substances like oils or balsams that the picnometer is needed.

Lyons, A. B., asserts that while the Pharmacopœia presumes that picnometers calibrated at 25° C. can be easily procured, his experience is that instrument makers in America can not be trusted to supply such apparatus.—Pharm. Rev. Milwaukee, 1907, v. 25, p. 356.

Miller, J. H., in discussing the need for a pharmacopœia of a more imperial character, points out that the standard temperature for taking specific gravity is 60° F., and that it is quite impracticable to take frequent specific gravities at that temperature in Natal. The U. S. P. VIII has adopted a standard temperature of 77° F. In an imperial pharmacopœia a set of tables ought to be included, giving specific gravities of standard preparations at different temperatures.—Pharm. J. Lond., 1907, v. 24, p. 789.

An editorial discusses the remarks by Miller, and points out that it is not necessary to go so far afield as Natal; even an average British summer is a severe tax on the patience of the working pharmacist in the matter of specific gravity and temperature. The

range of temperature might be given as from 10° to 25° C.—*Ibid.*, v. 24, p. 802.

Lyons, A. B., discusses the specific gravity of some official liquids at different temperatures, and gives a comprehensive table including many of the official substances, giving the specific gravity at 25°, at 15°, and the corrections necessary for each 1° C.—*Am. Druggist*, N. Y., 1907, v. 51, p. 303.

Alcock, F. H., describes a method for the determination of the specific gravity of substances, of essential oils, and other liquids which are available only in small quantities.—*Pharm. J. Lond.*, 1907, v. 24, p. 6.

SOLUBILITIES.

The *Ph. Helv.* IV outlines a method for determining the solubility of preparations; the solubility determinations are to be made at 15° C.

Magie, William Francis, discusses the association theory of solutions and reviews some of the theories that have been advanced.—*Proc. Am. Philosoph. Soc.*, 1907, v. 46, pp. 138–145.

Lumsden, John Scott (*Univ. Coll. Dundee. J. Chem. Soc.*, 91, 24–35), asserts that the molecular volumes of a number of organic substances when dissolved in different organic solvents were determined at temperatures from 10° to 100°. The results indicate that in the cases studied the volume occupied by a substance in solution is nearly the same as the volume of the pure substance as a liquid at the same temperature, differing from it, however, by the same amount at all temperatures.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 956.

Sutherland, W. (*Phil. Mag.* (6) 12, pp. 1–20, 1906), discusses the molecular constitution of aqueous solutions from the point of view that water consists of a mixture of trihydrol (H_2O)₃ and dihydrol (H_2O)₂, ice being pure trihydrol, water at its critical temperature being nearly pure dihydrol, while aqueous vapour is hydrol (H_2O).—*Physikal. Chem. Centralbl.*, 1907, v. 4, pp. 455–456.

Centnerszwer, M. (*Riga. Physik. chem. Lab. Polytech. Inst. Z. Physik. Chem.*, 61, 356–65), made a comparative study of the effect of the nature of the solvent on the molecular elevation of the critical temperature of a solution which showed: (1) That the relative molecular elevation of the critical temperature corresponds only approximately to the constant value 3, required by van't Hoff formula and is dependent further on the nature of the solute and the solvent; (2) the value of this constant decreases as the critical temperatures of the two constituents approach each other. The conclusions are based on experiments with seven solvents and ten solutes.—*Chem. Abstr. Am. Chem. Soc.*, 1908, v. 2, p. 612.

MELTING POINT DETERMINATIONS.

The Ph. Helv. IV outlines a method for determining the melting point of substances, also gives general directions for preparing substances for the determination of melting points.

The Ph. Dan. VII also outlines the method for determining the melting point of fats and of other substances.

Thomann, J., points out that the apparatus that is to be used for the determination of the melting point of official substances, according to the Ph. Helv. IV method, is essentially Thoms' modification of the Roth apparatus. He also points out that a widely used and efficient trick for preventing the gradual coloration of the sulphuric acid is to add a crystal of sodium nitrate.—Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 715.

Thiele, J., describes and figures an apparatus for the melting point determinations which, it is claimed, has the advantage of producing a ready circulation of the sulphuric acid, an even heating of the material and greater accuracy.—Apoth. Ztg. Berl., 1907, v. 22, p. 396.

Müller, Gustav. (Chem. Ztg., 1907, p. 511), describes and figures a thermometer specially designed to facilitate the determination of melting points.—*Ibid.*, v. 22, p. 495.

Guttman, Leo Frank, contributes a second paper on the determination of melting points at low temperatures; among others: Ether = -117.6° ; ethyl alcohol = -117.3° ; acetone = -94.6° . He comments on the value of the melting point as a criterion of purity.—J. Am. Chem. Soc., 1907, v. 29, pp. 345-349.

Wöhlk, Alfred, describes and figures the apparatus necessary for determining the melting point of chemical substances.—Arch. f. Pharm. og. Chem. Copenhagen, 1907, v. 14, p. 304.

BOILING POINT DETERMINATIONS.

The Ph. Helv. IV describes a method for determining the boiling point of various official substances.

Beckmann, Ernst, discusses the determination of the boiling point and points out the difficulty of avoiding overheating. He concludes that direct heating either with gas or electricity gives the more reliable results; care must, however, be exercised to avoid overheating.—Chem. Ztg., Cöthen, 1907, v. 31, p. 920.

THERMOMETRY.

The Ph. Helv. IV directs that a medium temperature, 15° C., is to be understood unless otherwise directed. Ordinary temperature has a range of from 15° to 20° C. Warm water has a temperature of from 60° to 70° and hot water a range from 85° to 95° .

The Ph. Dan. VII directs that the centigrade scale thermometer be used. Ordinary temperature is to be understood as being 15° C. For water, cold water is water at ordinary temperature; lukewarm water is water having a temperature of from 35° to 45° C.; and warm water is water having a temperature above 60° C.

POLARIZATION AND REFRACTION.

Thurston, Azor, discusses the practical application of the polariscope in the determination of the identity and purity of certain pharmacopœial substances, and presents a list of communications on the subject.—Merck's Report, N. Y., 1907, v. 16, pp. 123–125.

v. Kazay, Endre, discusses the value and the method of determining the refractive index of various liquids.—Pharm. Post, Wien, 1907, v. 40, pp. 507–509.

Cesàro, G. (Bull. Acad. Roy. Belg., Cl. Sci., 1907, 135–58), describes a new method for the determination of the indices of refraction using Wollaston's Goniometer, without the addition of any special apparatus for measuring the indices.—Chem. Abstr. Am. Chem. Soc., 1908, v. 2, p. 47.

Rammstedt, O. (Pharm. Ztg., 52, 991–4), discusses the application of the immersion refractometer with reference to its utility for the apothecary. While extremely convenient in the control of routine operations and standardizing of products, the instrument is comparatively expensive and less generally useful than the balance.—*Ibid.*, v. 2, p. 690.

5. APPARATUS.

Hughes and Barrow describe and figure a very simple device for filling bottles from carboys, consisting of a special rubber stopper and a suction pump.—J. Am. Chem. Soc., 1907, v. 29, pp. 241–242.

Campbell, Edward De Mille, describes and figures a convenient air bath and hot plate used at the University of Michigan for the past ten years.—*Ibid.*, v. 29, pp. 283–286.

Francis, C. K., gives a figure and description of a simple and cheap one-piece test-tube stand.—*Ibid.*, v. 29, pp. 787–788.

Lang and Allen figure and describe a modification of the apparatus of Tarugi and Bianchi for the rapid estimation of sulphates and salts of barium.—J. Chem Soc. Lond., 1907, v. 91, pp. 1370–1373.

An unsigned article describes and figures a new fermentation saccharometer.—Am. Druggist, N. Y., 1907, v. 50, p. 198.

Basler, A. (Münch. Md. Wchr., 1907, No. 50), recommends and describes with illustrations a fermentation saccharometer which is easily cleaned, conveniently used, and accurate in results.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 367.

Goldschmidt, R. (D. Med. Wschr., 1907, No. 25), has devised a combined burette and reservoir which he illustrates and which is supplied by a Berlin manufacturer. In this apparatus the reservoir for the titrating fluid is united with the burette by a three-way cock. A large bore serves for the communication between the reservoir and burette, and a small bore establishes the communication with the outer air.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 33.

The Ph. Helv. IV directs that tests are to be conducted in tubes of about 15 mm. diameter, and where not otherwise specified a quantity of liquid about 5 cc. is to be used, but wherever specific directions are given the quantities indicated are to be used.

6. FILTERS.

Mansier presents an interesting and suggestive paper on the fixation of chemical substances by filter paper—of special importance in legal chemistry.—Ann. de chim. analyt. Par., 1907, v. 12, pp. 397-400.

Labat, M. A., calls attention to the possibility of error due to filter paper in analytical chemistry.—Bull. de la Soc. de Pharm. de Bordeaux, 1907, v. 47, pp. 43-46.

Scoville, Wilbur L., discusses some of the problems in connection with the use of filter papers in pharmacy, and points out that it is advisable to use filter paper adapted to the particular liquid that is to be filtered.—Drug. Circ., N. Y., 1907, v. 51, p. 458.

7. COLOR STANDARDS AND COLORS.

Ives, Frederic E., describes and illustrates a new color meter which he believes is capable of measuring all colors and of expressing them in numerical terms.—J. Frankl. Inst., Phila., 1907, v. 164, pp. 47-56.

An unsigned article (Chem. Eng., 5, 213-14) describes a colorimeter apparatus which is an improved form of Kinnicott's colorimeter, and said to be very efficient and also capable of rapid operation.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1807.

Horn and Blake (Am. Ch. J., 36, 516-521. Bryn Mawr Coll.) have investigated the variation of sensitiveness with concentration in the colorimetry of ammoniacal solutions of copper sulphate. The same general relations were found to hold here as in previous cases, except that the maximum of sensitiveness is much more accentuated.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 156.

Stokes and Cain, discuss the colorimetric determination of iron, with special reference to chemical reagents, describing and figuring a simple colorimeter which they have devised.—J. Am. Chem. Soc., 1907, v. 29, pp. 409-443.

Circular No. 35, Bureau of Chemistry, U. S. Department of Agriculture, deals with the solubility and extraction of the leading coal-

tar dyes and vegetable coloring matters, and the color reactions of these coloring matters. The results of the investigation are given in the form of tables, which provide the analyst with a convenient and useful source of information.—*Pharm. J. Lond.*, 1907, v. 25, p. 623.

LaWall, Charles H., outlines a modification of Martin's butter-color method as applied to the detection of added colors in spices. The test as modified is as follows: Mix 15 cc. alcohol with 2 cc. carbon disulphide and add 2 grams of the suspected spice; shake thoroughly and then add 5 cc. of melted lard or liquid petrolatum and again shake the mixture vigorously for several minutes; allow the mixture to separate, decant and filter the alcoholic layer and apply appropriate tests for dissolved colors.—*Am. J. Pharm. Phila.*, 1907, v. 79, pp. 326–327.

Alvarez, E. Pinerua, discusses some color reactions obtained by means of the new general reagent of the polyphenols and their isomers, the hydrate of sodium dioxide ($\text{Na}_2\text{O}_2 \cdot 8\text{H}_2\text{O}$) prepared from sodium dioxide ($\text{Na}_2\text{O}_2 = 2\text{NaO}$), pure ethyl alcohol ($D=0.797$) and cold water.—*Pharm. J. Lond.*, 1907, v. 24, p. 6.

8. ANALYTICAL METHODS AND RESULTS.

Wiley, H. W., as editor presents official and provisional methods of analysis proposed by the Association of Official Agricultural Chemists for use in connection with the administration of the food and drugs act of June 30, 1906.—*Bull. Bur. Chem., U. S. Dept. Agric.*, 1907, No. 107, p. 230.

Murray, Benjamin L., discusses various methods for testing drugs and chemicals.—*Merck's Report*, N. Y., 1907, v. 16, pp. 247–249.

Remington, Joseph P., reports that 12 tests throughout the U. S. P. were omitted because they were not conclusive, or were more efficiently covered by another, or for some other reason were undesirable.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 446.

The report of the N. W. D. A., committee on standards and tests of the U. S. P. and National Formulary, discusses the changes that have been made in the U. S. P. and the reasons for making them.—*Am. Druggist*, N. Y., 1907, v. 51, p. 255.

Kahn, Joseph, points out that it is of the utmost importance that the ingredients used in the compounding of physicians' prescriptions shall be of the highest possible purity. The task of assuring this he thinks is a most difficult one.—*Proc. New York Pharm. Ass.*, 1907, p. 238.

Gilmour, J. P., discusses the need for testing drugs and chemicals and presents a table giving the number of samples examined and the average deficiency of pure substances present. He observes that many retail pharmacists are deterred from engaging in the systematic

testing of drugs and chemicals for two reasons; the first being that such work lies beyond the reach of anyone save a professional analytical chemist, and the second, that even if this disability were overcome, the labor is too troublesome and costly to be compatible with ordinary shop business, but considers that neither of these views is justified, and sets out some suggestions in proof of his assertion.—*Pharm. J. Lond.*, 1907, v. 25, pp. 108–110.

Murray, B. L., points out that our present text-books contain a number of undesirable tests, and that the U. S. P. VIII is no exception to this general statement.—*Merck's Report*, N. Y., 1907, v. 16, p. 63.

A news note gives a report of a pharmaceutical meeting in Philadelphia at which the official standards and tests were severely criticised.—*Am. Druggist*, N. Y., 1907, v. 51, p. 311.

Rupp, E., discusses the use of sodium borate for the standardizing of titrimetric solutions.—*Chem. Ztg. Cöthen.*, 1907, v. 31, p. 97.

Phelps and Hubbard recommend the use of succinic acid as a standard in alkalimetry and acidimetry.—*Am. J. Sc.*, 1907, v. 23, pp. 211–213.

Perman, Edgar Philip, discusses the chemical reaction between salts in the solid state; finding that they usually undergo double decomposition when mixed (and not specially dried).—*Chem. News, Lond.*, 1907, v. 96, pp. 3–6.

Howards & Sons point out that the wording in connection with the chemical tests in the *Ph. Japon. III* is very vague and some expressions as “no change” when speaking of tests for metals are very indefinite and unsatisfactory. They believe that the principle adopted in the U. S. P. of stating approximate quantities to be used for qualitative tests and clearly defining the reactions which take place is an enormous improvement of this wording.—*Chem. & Drug, Lond.*, 1907, v. 71, p. 693.

9. CHEMICAL CONSTANTS.

Frerichs, G., suggests that the *Ph. Germ.* include requirements for acid number, ester number, saponification number, and iodine number, and prescribe general methods for determining these factors.—*Apoth. Ztg., Berl.*, 1907, p. 13.

Baur, Emil (*Chem.-Ztg.*, 30, 997), publishes an article containing a discussion of such points as may serve for the permanent establishment of international constants of chemistry.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 954.

Oldberg, Oscar, presents some notes on the classification of the principal inorganic chemical compounds which he believes should be based on structure and properties, as: 1—binary compounds; 2—acids; 3—bases; and 4—salts.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 419–423.

An editorial points out that preliminary to the work of revision of the chemical constants a complete digest was made from a dozen of the most important pharmacopœias of the world. The differences which appeared were striking indeed, and demonstrated how practically impossible it is to get anything like absolute uniformity in these standards. Absolute uniformity is a myth and exists only in the minds of the uninformed. In science everything is relative, and it is only through adjustments of relative standards that practical uniformity is secured.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 197.

10. TESTS.

HALOGENS.

Rosanhoff and Hill describe a necessary modification of Volhard's method for the determination of chlorides.—J. Am. Chem. Soc., 1907, v. 29, pp. 269–275.

Reichard, C., outlines several tests for distinguishing the haloids in alkaline combination, based upon the behavior of the respective haloid compounds with mercuric iodide.—Pharm. Ztg., Berl., 1907, v. 52, p. 221.

Schuyten, M. C., discusses the possible reactions of the halogen elements with mercury and the halogen salts of mercury, and points out that so far as mercury at least is concerned the usual arrangement of the halogen elements, Cl., Br., I. does not apply.—Chem. Ztg. Cöthen., 1907, v. 31, p. 1135.

Zincke and Hedenström (Chem. Inst. Univ. Marburg. Ann., 350, 269–287) give a method for determining the action of bromine and chlorine on phenols, substitution products, pseudobromides, and pseudochlorides.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1123.

Stepanow, A. (Ber., 39, 4056–4057, Med. Chem. Lab., Univ. of Moscow), outlines a method for the determination of halogens in organic compounds.—*Ibid.*, v. 1, p. 397.

Andrews, Launcelot W., contributes a note on the direct quantitative separation of chlorides and bromides.—J. Am. Chem. Soc., 1907, v. 29, pp. 275–283.

METALS.

Remington, Joseph P., points out that it was found after conference with the chemical manufacturers that the "heavy-metal test," particularly in respect to the presence of traces of iron, was too stringent, and it was corrected; this involved 15 changes.—Meyer Bros., Drug., St. Louis, 1907, v. 28, p. 446.

Cockling, T. T. (Chem. and Drug., 69, 507), gives three methods which have been used for determining lead in zinc oxide.—Year Book of Pharmacy, Lond., 1907, p. 90.

Bertrand and Javillier describe an extremely sensitive method for the precipitation of zinc.—*Ann. de chim. analyt. Par.*, 1907, v. 12, pp. 179–181.

Repiton, Fernand, discusses the titrimetric estimation of zinc.—*Ibid.*, v. 12, pp. 183–186.

Stähler, A. (*Chem. Ztg.*, 31, 615–616), describes a process for the use of sodium phosphate in the separation and determination of bismuth and mercury.—*Chem. Abstr. Am. Chem. Soc.*, 1908, v. 2, p. 242.

Randall, D. L., discusses the titration of mercurous salts with potassium permanganate, and shows that mercurous sulphate and mercurous nitrate can be readily estimated by potassium permanganate with a very fair degree of accuracy, and that ferrous salts can be successfully titrated in the presence of at least 3 per cent of nitric acid.—*Am. J. Sc.*, 1907, v. 23, pp. 137–140.

SULPHUR AND SULPHATES.

Ebaugh and Sprague describe two methods for the use of sodium carbonate and zinc oxide in sulphur and arsenic determination.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 1475–1476.

Pickering, Spencer Umphreville, reports on the interaction of metallic sulphates and caustic alkalis, including those of copper, iron, zinc, magnesium, and aluminum.—*J. Chem. Soc. Lond.*, 1907, v. 91, pp. 1981–1988.

Lang and Allen describe and figure an apparatus for the rapid estimation of sulphates and salts of barium which consists of an Erlenmeyer flask provided with a two-hole stopper, one hole carrying a narrow thistle tube which extends to the bottom of the flask and is fitted 3 inches below the funnel with a stopcock, and at the lower end with a plug of glass so that the middle arm is parallel to the thistle tube. This arm is closed by a piece of rubber tubing and pinchcock while the other arm is fitted with a rubber bulb. He describes the method of procedure.—*Ibid.*, v. 92, pp. 1370–1373.

Pellet, H., discussing the calcination of precipitates of barium sulphate and the dessication of precipitates before calcination, says he has been unable to confirm absolutely the results of de Koninck.—*Ann. de chim. analyt. Par.*, 1907, v. 12, pp. 186–188.

NITRATES.

Collins, S. W. (*Analyst*, 32, 1907, No. 379, pp. 349–357) reports on the results of tests of Bush's nitron method (*E. S. R.*, 16, p. 945) on a number of different nitrates, and describes methods of recovering and using the base from the precipitates.—*Exp. Sta., Rec.*, 1907–8, v. 19, p. 705.

Visser, H. L. (Chem. Weekbld., 3, 1906, pp. 743-746) recommends that instead of weighing the nitron nitrate in determining nitric acid the determination be made by comparing the depth of the layer of precipitate with that of a corresponding precipitate from a solution of known content of nitric acid in glass tubes of equal diameter.—*Ibid.*, v. 19, p. 109.

Vriens, J. G. C. (Ztschr. Analyt. Chem., 46, 1907, Nos. 6-7, pp. 414, 420) describes a method based upon the oxidation of ferrous ammonium sulphate when boiled with sulphuric acid and nitrates.—*Ibid.*, v. 19, p. 506.

Van Deventer, C. M. (Chem. Weekbld., 4, 1907, pp. 594-595), defends his method against the criticism of Vriens, maintaining that boiling with a strong acid and an excess of ferrous salt can not lead to satisfactory results unless the air is rigidly excluded.—*Ibid.*, v. 19, p. 705.

See also Chemical Abstracts.

CARBON DIOXIDE.

Malherbe, P., describes and figures apparatus for the estimation of carbonic acid in carbonates.—Ann. de chim. analyt., Par., 1907, v. 12, pp. 261-263.

Breteau and Leroux present a method for the estimation of carbon and hydrogen in organic substances which is commended for rapidity of execution, simplicity of apparatus, and precision of results obtained; it offers, moreover, the advantage of having in sight all the time the progress of the destructive distillation of the substance, likewise of noting the complete oxydation of all the residual carbon.—*Ibid.*, v. 12, pp. 385-392.

AMMONIA.

Ronchése, A. (Jour. Pharm. et Chim., 25, 1907, pp. 611-617), describes a method based upon Delèpine's observations that formaldehyde reacts with ammonium chloride to form hexamethylene-tetramine, and that if the formaldehyde is in excess all of the acid of the ammonium salt is liberated and may be titrated with standard alkali (tenth-normal sodium hydroxide) using phenolphthalein as indicator.—Exp. Sta. Rec., 1907-8, v. 19, p. 407.

Artmann and Skrabal (Ztschr. Analyt. Chem., 46, 1907, pp. 5-17) propose a method in which an excess of sodium hypobromite of known strength is added to the ammonia or ammonium salt and the undecomposed hypobromite is determined in the usual way by adding potassium iodide and dilute sulphuric acid and titrating with standard thiosulphate. using starch as an indicator.—*Ibid.*, v. 19, p. 208.

Ronchése, A. (Compt. Rend. Soc. Biol., Paris, 62, 1907, No. 16, pp. 867-869), explains the application of his method which has already been noted (E. S. R., 19, p. 407), to the examination of ammoniacal salts, urea, and urine, and to the determination of total nitrogen and urinary ammonia.—*Ibid.*, v. 19, p. 1008.

POTASSIUM.

Meyer, G. C. (Chem. Zeit., 1907, 31, 158-159), discusses the use of phosphotungstic acid as a reagent for potassium salts.—Analyst, London, 1907, v. 32, p. 130.

De Vries, H. J. F. (Chem. Weekbl., 4, 1907, pp. 231-242), discusses the causes of error in the estimation of potassium by the platinum chloride method and states his views as to the best means of avoiding them. He gives a summary of work on the subject.—Exp. Sta. Rec., 1907-8, v. 19, p. 407.

ANTIMONY.

Sanger & Gibson discuss the determination of small amounts of antimony by the Berzelius-Marsh method and illustrate the apparatus that is used by them.—J. Soc. Chem. Ind., Lond., 1907, v. 26, pp. 585-589.

ARSENIC.

Caldwell, B. P., calls attention to the possibility of producing a bismuth stain with a Marsh apparatus unless precautions are taken to avoid the possibility of carrying over particles of bismuth.—Am. J. Pharm., Phila., 1907, v. 79, pp. 201-203.

Chapman, Alfred C., discusses the estimation of minute traces of arsenic and recommends the addition of a small percentage of cadmium salt to the evolution flask with the zinc.—Analyst, London, 1907, v. 32, pp. 247-248.

Goldschmiedt, Guido, discusses the detection of arsenic in glycerin according to the methods proposed in the Ph. Austr. VIII and Ph. Germ. IV. He reviews some of the recent literature relating to and opinions on the detection of arsenic in glycerin and points out that a permissible limit of 20 mg. As_2O_3 in a liter of glycerin, or approximately 12 parts of arsenic in a million might be considered rather high.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, pp. 375-377.

Lochmann outlines a method for the determination of arsenic by means of a solution of mercuric chloride. He presents a table showing the results of experimental work.—*Ibid.*, v. 45, pp. 544-545.

Schoorl, N., discusses the official Ph. Ndl. IV test for arsenic, the substances in which arsenic is to be looked for, and the results that have been obtained. He concludes that the present official reaction

gives irregular results and is not as reliable as the formerly official Gutzeit test.—*Pharm. Weekbl.*, 1907, v. 44, pp. 57–67.

Lockemann, G., discusses the detection of minute quantities of arsenic and outlines a method for the production of arsenic-free chemicals.—*Pharm. Ztg.*, Berl., 1907, v. 52, p. 817.

Sanger & Black discuss the quantitative determination of arsenic by the Gutzeit method, describe their method at some length, illustrate the apparatus used by them and give the results obtained.—*J. Soc. Chem. Ind. Lond.*, 1907, v. 26, pp. 1115–1123.

Chapman and Law outline a method for the electrolytical determination of minute quantities of arsenic, and also discuss some of the other methods for determining small quantities of arsenic.—*Ztschr. f. ang. Chem. Berl.*, 1907, v. 20, pp. 67–78.

Strzyzowski (*Pharm. Post*, 1906, 42) outlines a method for the detection of arsenic in organic matter and dietetic articles, which depends on the fixation of arsenic as magnesium arsenate, and the burning off of the organic matter, and testing the solution of the resulting ash by Marsh's method in the usual manner.—*Pharm. J. Lond.*, 1907, v. 24, p. 293.

SUGAR DETERMINATION.

Ito, S. (*Journ. Pharm. Soc.*, of Japan, 1907, No. 310) recommends that the cuprous oxide produced in sugar determinations by Allihn's modification of Fehling's method be weighed as such, and the corresponding weight of copper calculated from the figures obtained. He bases his recommendations on the observation that the cuprous oxide is not appreciably reduced in weight even when exposed to 90°–100° C. for four hours on drying it.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 366.

Benedict, S. R. (*Jour. Biol. Chem.*, 3, 1907, No. 2, pp. 101–117), recommends a copper-carbonate solution as a method of estimating sugar and gives directions for its preparation. For delicate work in sugar detection, either in pure solutions or in urine, the reagent should be freshly mixed and diluted. He also outlines a method for the volumetric estimation of sugar.—*Exp. Sta., Rec.*, 1907–8, v. 19, p. 8.

An unsigned article (*Annales de Chim. Analyt.*, 12, 255) points out that saccharimetric determinations of syrups which show a notable predominance of glucose over lævulose point to the presence of added glucose.—*Year Book of Pharmacy, Lond.*, 1907, p. 155.

Bourquelot, Em., proposes the determination of cane sugar, in plants, by means of invertin. He discusses the history of invertin, its production, its application, and the results that he has obtained. He concludes that cane sugar is an essential constituent in chlorophyll-containing plants. *Arch. d. Pharm.*, 1907, v. 245, pp. 164–171.

Carletti, O. (Boll. chim. farm., 1907, 5), outlines a test for saccharose or glucose in mannite: Place in a test-tube 2-3 cc. of H_2SO_4 and 5 drops of 1 per cent alcoholic solution of menthol, thymol, or *a*-naphthol. Menthol produces no color, thymol a clear yellow and *a*-naphthol a greenish yellow. To this solution carefully add without mixing a solution of 0.1 gm. of the mannite in 5 cc. of water. If the mannite contains saccharose, glucose, or other carbohydrates, giving the furfural reaction, a rose-colored ring is formed with thymol or menthol, or blue-violet with naphthol.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2929.

Rudisch and Celler describe a method for the quantitative determination of glucose in the urine by a modification of Fehling's solution.—J. Am. M. Ass., 1907, v. 48, p. 324.

Pavy, F. W. (Guy's Hosp. London, Lancet, 173, 263 and 361-65, 1907), investigated the influence of various constituents of the urine, creatinine, *water*, mucin, etc., on the character of the cuprous oxide precipitate obtained by heating urine containing glucose with Fehling's solution. Creatinine inhibits the coalescence of the particles. The author believes that the usefulness of Fehling's solution lies in its moderate delicacy. Small amounts of reducing agents which have no clinical significance are not shown by the test.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2722.

5. BIOLOGIC PRODUCTS.

Hallion and Carrion present a note on the experimental assay of the opotherapeutic extract of the hypophysis which calls out an interesting discussion of the keeping qualities of therapeutic sera.—J. de pharm. et de chim. Par., 1907, v. 25, pp. 411-413.

Koch, F. C., discusses organotherapeutic products and points out that of the many products of this kind used but 5, pepsin, pancreatin, suprarenals, thyroids, and bile, are included in the U. S. P.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 368-372.

Joseph, Don R., reports on a further investigation of the influence of organ extracts of cold-blooded animals on the blood pressure and describes the method of preparing extracts and the method of recording results. None of the extracts examined were found to be potent in small doses. A noticeable effect, however, on the blood pressure is produced by the extract of shark testis.—J. Expr. M., N. Y., 1907, v. 9, pp. 606-624.

The same author also presents a comparison of the properties of organ extracts of cold- and warm-blooded animals in the form of a table of parallel columns.—*Ibid.*, v. 9, p. 625.

An unsigned article reviews the probable therapeutic value of organotherapeutic preparations.—Therapist (The), London, 1907, v. 17, pp. 10-12, 23-24, 34-36.

Arnold, L., presents a discussion of and describes some of the animal drugs used by the Arabs.—*Bull. de Pharm. du Sud-Est.*, 1907, v. 12, pp. 369–374.

Drescher, August, discusses the chemistry and possible uses of lecithin and outlines the following classification for albuminoid bodies: (1) Albuminous bodies, (2) nucleins, (3) chloesterines, (4) enzymes, and (5) lecithins, etc.—*Merck's Report*, N. Y., v. 16, p. 253.

Hommell, P. E., presents a description of lecithin and concludes that there is no future for this product from a therapeutic standpoint.—*Proc. New Jersey Pharm. Ass.*, 1907, pp. 58–59.

The Council on Pharmacy and Chemistry describes lecithin, and states that the ordinary diet contains from 75 to 225 grains (5 to 15 gms.) of lecithin, and that some authorities maintain that an increased diet of lecithin-containing food (eggs, etc.) would suffice to obtain the effects of this substance.—*J. Am. M. Ass.*, 1907, v. 48, p. 1185.

ENZYMES.

Euler, H., discusses the general chemistry of enzymes, and presents a bibliography of 304 references and a table showing the reactions and the nature of the several animal and vegetable ferments.—*Ergeb. d. Physiol.*, 1907, v. 6, pp. 187–243.

A report of the meeting of the Baltimore branch of the A. Ph. A. records a discussion on ferments and enzymes.—*Am. Druggist*, N. Y., 1907, v. 50, p. 208.

Hedin, S. G., reports additional experiments to determine the enzyme-absorbing properties of charcoal and similar substances. The enzymes experimented with are those found in the spleen of the ox.—*Biochem. J. Liverpool*, 1907, v. 2, pp. 112–116.

An unsigned article points out that the idea of employing yeasts and ferments in therapeutics is by no means new, and that from time immemorial beer yeast has enjoyed a reputation as a depurative or blood purifier.—*Chem. & Drug.*, Lond., 1907, v. 71, p. 909.

Vandeveld, A. J. J. (*Biochem. ZS.*, Bd. I., pp. 408–412, 1906), discusses the diffusion of enzymes through cellulose membranes and reports some experiments with invertin, maltase, rennin, zymase, and blood catalase.—*Physikal. Chem., Centralbl.*, 1907, v. 4, p. 38.

Leffmann, Henry, presents some observations on the action of anti-septics on some starch-converting enzymes and points out that, while the experiments recorded are too few to form a basis for generalization, they are nevertheless suggestive.—*Proc. Pennsylvania Pharm. Ass.*, 1907, pp. 238–240.

Vandeveld, A. J. J. (*Gent.-Belgien, Biochem. Z.*, 3, 315, 319), states that an iodoformketone solution will keep milk sterile for days and at the same time will not retard the action of enzymes.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 1145.

Bayliss, W. M., records some observations on the cause of the rise of electrical conductivity under the action of trypsin.—*J. Physiol., Lond., 1907-1908, v. 36, pp. 221-252.*

OPSONINS.

Houghton, E. M., presents a review of the opsonins and bacterial vaccines; also includes a bibliography on the subject.—*Therap. Gaz., Detroit, 1907, v. 31, pp. 24-28.* (See also *Am. J. Pharm., Phila., 1907, v. 79, pp. 141-147.*)

Miller, E. C. L., describes and figures the various steps necessary for determining the opsonic index of the blood.—*Therap. Gaz., Detroit, 1907, v. 31, pp. 173-180.*

Hitchens, A. Parker, discusses the theory of the opsonic index and of bacterial vaccines.—*Am. J. Pharm., Phila., 1907, v. 79, pp. 556-563.*

Burvill-Holmes, E., discusses the opsonic index theory in relation to tuberculosis.—*Ibid., v. 79, pp. 563-569.*

Crace-Calvert, George A., discusses opsonins, the opsonic index and their practical value in the treatment of disease.—*Lancet, Lond., 1907, v. 172, pp. 279-282.*

Wright, Almroth E., discusses the principles of vaccine therapy.—*J. Am. M. Ass., 1907, v. 49, pp. 479-487, 567-573.*

An editorial discusses the opsonic index in certain infectious diseases and reviews some of the more recent work.—*Ibid., v. 49, p. 1442.*

Additional references will be found in the *Index Medicus* and the *J. Am. M. Ass.*

6. VEGETABLE DRUGS.

An editorial in discussing the pharmacopœial changes in crude drugs points out that the general complaint among the trade appears to be not in that the reductions have been too radical, but that they have been too light in most instances and that there have been too few of them.—*Oil, Paint, and Drug Reporter, N. Y., 1907, v. 71, Feb. 25, p. 8.*

An editorial points out that due to the enforcement of the pure food and drugs act dealers are beginning to experience difficulty in disposing of many crude drugs owing to the fear on the part of the manufacturers as to whether or not such drugs may answer the requirements of the Pharmacopœia.—*Am. Druggist, N. Y., 1907, v. 50, p. 33.*

Gausby, R. A., asserts that there is no difficulty in procuring ample supplies of good quality crude drugs. He believes that deliberate adulteration or substitution is rare and that a poor quality drug is due to carelessness or ignorance rather than to intentional fraud.—*Proc. Pennsylvania Pharm. Ass., 1907, p. 73.*

An editorial points out that one fact in connection with the history of the changes in pharmacopœial strength that is worthy of notice is that there is ever since the reduction, a marked improvement in the strength of the drugs arriving for American consumption. This can be easily traced to former rejections, which made foreign shippers careful to send nothing but goods of high strength to this country.—*Oil, Paint, and Drug Reporter*, New York, 1907, v. 71, April 22, p. 8.

Francis, John M., expresses the belief that it will be many years before the present really deplorable conditions in connection with domestic drugs can be changed. Our native drugs are gathered by the most poorly paid and ignorant class, who have no regard whatever for legislation and who know nothing of drug standards. Their small collections of drugs are purchased by the country dealers, and these in turn will sell them to the larger drug factors or jobbers, and thus the various small lots finally become merged in the larger quantities that reach the consumer through the larger dealers.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 62.

Alcorn, Geo. S., discusses the desirability of encouraging the growing of medicinal plants, and expresses the belief that drug plants, if intelligently fertilized and cultivated, can be made to yield more than the required amount of active principle, and in many cases two or three times that amount.—*Proc. Tennessee Pharm. Ass.*, 1907, pp. 45-46.

Mitchell, Edward, discusses pure and prime drugs and to what extent jobbers can safeguard the pharmacist.—*Meyer Bros., Drug.*, St. Louis, 1907, v. 28, pp. 306-307.

Davis, S. C., discusses drug adulterants, and points out the desirability of systematic training in the use of the microscope to guard against adulteration and sophistication. He enumerates a number of the more common drug adulterants.—*Proc. Tennessee Pharm. Ass.*, 1907, p. 40.

Vanderkleed, Charles E., points out the value of a practical knowledge of the most essential requirements as to the quality and purity of the drugs handled by the retail druggist, and asserts that while it is true that he may not have the time actually to test all of his supplies for purity, the fact that he is well posted as to how to do it can be made of great value to him.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 57.

Gane, E. H., points out that retail pharmacists may get into trouble by purchasing assayed drugs from inexperienced dealers, and reports that drugs purchased from a prominent house assayed far below the alkaloidal content that was claimed for them.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 316.

Tschirch, A., discusses the origin and the application of the word "pharmacognosy."—*Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich*, 1907, v. 45, pp. 185-190.

Hanausek, Edward, reviews the progress made in pharmacognosy during the year 1906, and presents a number of references, including practically all of the more important original contributions during the year.—*Chem. Ztg. Cöthen.*, 1907, v. 31, pp. 299–301.

Mitlacher, Wilhelm, discusses the production of microphotographs, and presents a number of illustrations showing the possible application to the study of crude drugs.—*Ztschr. d. allg. österr. Apoth.-Ver.*, Wien, 1907, v. 45, pp. 311–313.

Tschirch, A., discusses the physiological chemistry of plant secretions and the possible explanation of the physiology of the cell.—*Arch. d. Pharm.*, 1907, v. 245, pp. 380–388.

Stscherbatscheff, D., presents a contribution to our knowledge of the development of several official plant drugs.—*Ibid.*, v. 245, pp. 48–70.

Holm, Theo., presents a number of descriptions, liberally illustrated, of the medicinal plants of North America.—*Merck's Report*, N. Y., 1907, v. 16, p. 65ff.

Henkel, Alice, presents an exhaustive discussion, with illustrations, of American root drugs, including all the official roots found in this country, besides most nonofficial root drugs that are frequently quoted in drug catalogues.—*Bull. Bur. Plant Ind.*, U. S. Dept. Agric., 1907, No. 107, pp. 80, Pl. 7, Fig. 25.

Schneider, Albert, presents a lengthy dissertation on the native and introduced poisonous and medicinal plants of California.—*Pacific Pharm.*, San Francisco, 1907–8, v. 1, pp. 17–24, 26–31, 74–80, 136–140.

Johnson, E. E., reports a study of the plants used by Indians and the early Spanish settlers of California.—*Ibid.*, v. 1, pp. 411–415.

Weck, F. A., discusses some of the medicinal plants of the Pacific coast and enumerates the more important of these.—*Ibid.*, v. 1, pp. 359–361.

Borneman, John A., enumerates a number of foreign medicinal drugs which have been successfully cultivated by him on a commercial scale.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 546.

Long, J., reports some additional experience in the growing of medicinal plants in Texas.—*Pharm. Era*, N. Y., 1907, v. 37, p. 177.

Farwell, O. A., discusses adulterations and substitutions of crude drugs and reports a number of observations in connection with drugs that are frequently adulterated.—*Merck's Report*, N. Y., 1907, v. 16, p. 220.

Maiden, J. H., presents some notes on plants which in drying stain paper, discusses the possible reasons for this, and enumerates a number of plants that have been found to stain the herbaris papers to which they are attached.—*Am. J. Pharm.*, Phila., 1907, v. 79, pp. 62–67.

An editorial discusses the prospects of the crops of crude drugs now under cultivation in England.—Pharm. J. Lond., 1907, v. 25, p. 2.

An editorial comments on the efforts that are now being made to awaken an interest in the growth of medicinal plants in the United States.—Am. Druggist, N. Y., 1907, v. 51, p. 300.

An unsigned article gives a description with illustrations of how plants are cultivated in southern France.—*Ibid.*, v. 50, pp. 322-324.

Eccles, R. G., gives the results of observations of drug plants during a tour of the world.—Pacific Pharm., San Francisco, 1907-8, v. 1, pp. 355-359.

Brandel, I. W., reviews the literature relating to plant pigments and discusses the several compounds known to influence the formation of color in plants.—Pharm. Rev., Milwaukee, 1907, v. 25, pp. 208-211, 238-241, 257-260.

Stephens quotes with approval an article in the Oil, Paint and Drug Review, under the caption "Returning to Herbs," and thinks the Eclectic School deserves the credit therefor.—Eclectic M. J., Cincin., 1907, v. 67, p. 630.

Ebert, Felix, presents a contribution to our knowledge of the Chinese materia medica and describes and figures many of the fruits and seeds used in China for medicinal purposes.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 423, ff.

Greenish, Henry G., points out that the descriptions of crude vegetable drugs in the Ph. Dan. VII are remarkable for the very extensive introduction of descriptions of microscopic structures, which have been systematically introduced for nearly every organized vegetable drug.—Pharm. J. Lond., 1907, v. 25, p. 463.

In the Ph. Helv. IV the botanical name of vegetable drugs is generally followed by the name of the author, written out in full, with the exception of a few of the more well-known botanists whose name is abbreviated. "Engler and Prantl, Die natürlichen Pflanzenfamilien," is the authority followed.

Thomann, J., points out that the Ph. Helv. IV descriptions of vegetable drugs are most complete and that they include morphologic and anatomic details and will require the use of the compound microscope with ocular micrometer for applying the necessary tests for identity.—Schweiz. Wchnschr. f. Chem. u. Pharm., Zürich, 1907, v. 45, p. 677.

1. POWDERED DRUGS.

Holm, Theo., discusses the application of the microscopic-anatomical and micro-chemical characters observable in the organs of animals and plants to the systematic distinction of these. Points out a number of instances where related plants have been found to contain widely varying structures.—Am. J. Pharm. Phila., 1907, v. 79, p. 56.

Nelson, Burt E., continues the descriptions of powdered crude drugs and the analytical scheme for their microscopical examination.—*Merck's Report*, N. Y., 1907, v. 16, p. 38ff.

He presents a classification of drug powders based on their sensible properties.—*Ibid.*, v. 16, pp. 163, 191.

Ziegler, W. H., discusses the need for controlling the identity and purity of powdered drugs, and points out that the compound microscope offers the only safe and ready method for doing this.—*Proc. South Carolina Pharm. Ass.*, 1907, pp. 20–21.

Hartwich, C. (*Schweiz. Wochenschr. Chem. u. Phar.*, 1907, p. 544), outlines a method for the sedimentation of plant powders, which he considers will be of assistance in microscopical examination.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 854.

Kramer, Hans, presents a series of contributions on the microscopic pharmacognostic knowledge of leaves and flowers, with illustrations.—*Ber. d. pharm. Gesellsch.*, Berl., 1907, v. 17, pp. 308–367.

In a discussion on the relative merits of maceration and percolation it is pointed out that one of the main objections raised against percolation was that it requires the use of powdered drugs, thus making the “apotheker” more dependent upon the wholesaler, as the analysis of powdered drugs requires more time than the actual process, or it demands the provision of grinding apparatus in every pharmacy.—*Chem. & Drug.*, Lond., 1907, v. 70, p. 34.

Tunmann reviews some of the literature relating to the oil glands in plants, their origin, form, and probable uses.—*Pharm. Ztg.*, Berl., 1907, v. 52, pp. 353–354. (See also communication by “Victor.” *Ibid.*, p. 418.)

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 11), discusses the applicability of the Ph. Austr. VIII limitations for ash in vegetable drugs and asserts that a number of them require revision. He points out that for powdered vegetable drugs particularly the determination of the ash content will prove to be an additional safeguard.—*Pharm. Post*, Wien, 1907, v. 40, p. 307.

Thomann, J., points out that the Ph. Helv. IV includes microscopic as well as macroscopic characteristics of drugs and that for powdered drugs that are found in commerce the micro-anatomic characteristics are included.—*Schweiz. Wchnschr. f. Chem. u. Pharm.* Zürich, 1907, v. 45, p. 678.

The authority for the anatomic descriptions of plant drugs in the Ph. Helv. IV is “Tschirch, *Angewandte Pflanzenanatomie*.”

2. VALUATION OF VEGETABLE DRUGS.

Robinson, William J., discusses the standardization of galenical preparations and concludes, in part, that standardization is unreliable, unscientific, and imperfect. He suggests the use of active prin-

ciples instead of the galenicals.—*Drug. Circ.*, N. Y., 1907, v. 51, pp. 297-298.

Rusby, H. H., discusses the paper by Robinson and points out that while it is true that the active constituent of a drug is sometimes better because of its "freedom from objectionable and irritating inert material" it follows as a corollary that in other cases such active constituent will be less useful because of its freedom from other desirable active constituents.—*Ibid.*, v. 51, pp. 298-300.

Robinson, William J., replies at some length but modifies his suggestion so as to read: give up *most* of the galenicals and use *wherever feasible* the active principle instead.—*Ibid.*, v. 51, pp. 407-409.

Coblentz, Virgil, asserts that only a trained expert in pharmacy would be competent to prove the strength of many crude drugs or of the alkaloids where the alkaloidal content is a matter difficult of determination. He also points out that there are many cases that respond to no known chemical test where the senses of smell, taste, and touch must be largely relied upon. In such cases a knowledge of pharmacognosy will go much further than a mere chemical experience.—*Pharm. Era*, N. Y., 1907, v. 37, p. 95.

Beckmann, Ernst, discusses the application of cryoscopic methods to the examination of spices and other drugs, outlines the more desirable methods of extracting the drug, and records the results obtained.—*Arch. d. Pharm.*, 1907, v. 245, pp. 211-234.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 11), points out that the moisture content of drugs is best determined by drying 2 gms. of the powdered substance for twelve hours at a temperature of 100° C., and weighing after allowing the substance to cool in an exsiccator. The difference in the two weighings multiplied by 50 gives the per cent content of moisture. Also outlines a method for determining the extract content of drugs.

The *Ph. Helv.* IV outlines a method for determining the aqueous extract of drugs, also a general method for determining the alcohol extract.

André, G., discusses the composition of vegetable juices extracted from the stems and from the leaves, and the migration of soluble principles in the vegetable.—*Compt. rend. Acad. d. sc. Par.*, 1907, v. 144, pp. 276-278, 383-386.

Dott, D. B., discusses the application of the word "resinoid" and reports some observations on the preparations that have been classified under this heading.—*Pharm. J. Lond.*, 1907, v. 25, p. 110.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 23), state that a ready macroscopical test for the detection of fairly large proportions of olive stone powder in some drugs is provided by phloroglucinol and hydrochloric acid. Pepper and fair qualities of gentian retain, to a great extent, their natural colors when so treated,



whereas the presence of much woody tissue is shown by the production of a pronounced pink or red color.

3. ASH DETERMINATIONS.

Wöhlk, Alfred, presents a table giving the permissible ash in a number of drugs and chemicals enumerated in the Ph. Dan. VII and in the previous edition of the same book.—Arch. f. Pharm. og. Chem., Copenhagen, 1907, v. 14, p. 322.

Greenish, Henry G., points out that in regard to the determination of ash or extract the Ph. Dan. VII exhibits a notable difference from the Ph. Austr., very few determinations of this kind being required.—Pharm. J. Lond., 1907, v. 25, p. 463.

Thomann, J., points out that the Ph. Helv. IV outlines a method for determining the ash content of vegetable drugs.—Schweiz. Wehnschr. f. Chem. u. Pharm., Zürich, 1907, v. 45, p. 678.

According to the Ph. Helv. IV the determination of unweighable residues is to be made by incinerating a specified quantity of the material, 0.1 or 0.01, the resulting ash to weigh more than 0.0005.

Philipp Röder (Jahresbericht, Wien, 1907, p. 11) determines the ash content of drugs by heating 1 to 2 gms. of the substance in an open crucible until constant weight has been attained.

van Itallie, L., discusses the determination of the ash content of some official Ph. Ndl. IV preparations.—Pharm. Weekbl., 1907, v. 44, pp. 743-746.

Alcock, F. H., points out that the determination of the ash of drugs has reached an important stage, and calls attention to the need for differentiating the nature of the resulting ash and determining the amount and kind of alkali present.—Pharm. J., Lond., 1907, v. 25, p. 122.

Hafner and Krist present some observations on the determination of the ash content of drugs, with particular consideration of the manganese content of the ash. They present a table showing the frequency with which manganese was found. In a total of 307 samples examined manganese was found in 295.—Ztschr. d. allg. österr. Apoth. Ver., Wien, 1907, v. 45, pp. 387-388, 399, 400.

Farnsteiner, K., points out the need for determining the nature and the composition of the ash of drugs and foods and reports experiments on a method for determining the true alkalinity of the ash content.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1907, v. 13, pp. 305-338.

Kramer, Hans, discusses the determination of ash in powdered leaf drugs and points out that the origin and the age of plants may materially affect the ash content.—Ber. d. pharm. Gesellsch., Berl., 1907, v. 17, pp. 360-363.

Philipp Röder (Jahresbericht, Wien, 1907, p. 11) points out that a number of the ash determinations that have been included in the Ph. Austr. VIII are in need of revision, and also points out that the de-

termination of the ash content of whole drugs, particularly roots and herbs, is impracticable and of but little value.

Judd, Albert F., calls attention to the importance of ash determinations of vegetable drugs and records a number of observations with asafetida, aloes, capsicum, and black pepper.—*Proc. Pennsylvania Pharm. Ass.*, 1907, pp. 259-260.

4. GLUCOSIDES.

Rosenthaler, L., discusses the classification of glucosides and reviews the several classifications suggested by Hlasiwetz, v. Lippmann, and others.—*Pharm. Zentralh.*, 1907, v. 48, pp. 949-955.

Guignard, L. (*Compt. rend.*, 145, 1907, p. 1376), communicates some results which he obtained by grafting experiments with plants yielding cyanogenetic glucosides.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 173.

Bourquelot, Em., discusses the determination of glucosides in plants by means of emulsin, the discovery of emulsin, and the behavior of glucosides under its influence; also enumerates a number of plants that have been examined.—*Arch. d. Pharm.*, 1907, v. 245, pp. 172-180.

Vintilescu, J., reports on the glucosides found in several plants belonging to the *Oleaceæ*.—*Ibid.*, v. 245, pp. 180-199.

Danjon, Em., discusses the application of biochemical methods to the discovery and estimation of cane sugar and glucosides in plants of the natural order *Caprifoliaceæ*.—*Ibid.*, v. 245, pp. 200-210.

5. ALKALOIDS.

Göszling, F. W., discusses the origin, history, and chemistry of the alkaloids used in medicine.—*Pharm. Post*, Wien, 1907, v. 40, pp. 471-475, 491-495.

Gordin, H. M., completes his review of the progress in alkaloidal chemistry during the year 1905.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, pp. 22-24, 48-57, 85-87, 108-115, 139-146.

Also reports on the progress in alkaloidal chemistry during the year 1906.—*Ibid.*, v. 25, pp. 169-179, 199-205, 225-235, 261-272, 313-316.

Kwisda, A., discusses the advances that have been made in the chemistry of the alkaloids during the year 1906.—*Pharm. Post*, 1907, v. 40, pp. 153-154, 181-182.

Pfeiffer, P., reviews the advances that have been made in the chemistry of alkaloids during the past two years.—*Chem. Ztschr.*, 1907, v. 6, pp. 101-106, 121-124.

Schmidt, Ernst, discusses the chemistry of alkaloids, their origin, their use to the plant, and the possibility of their synthesis.—*Apoth. Ztg.*, Berl., 1907, v. 22, pp. 911-916.

Atkins, Donah Josiah, discusses the official alkaloids and salts of alkaloids and enumerates the several pharmacopœial tests.—*Proc. North Carolina Pharm. Ass.*, 1907, pp. 54-66.

An editorial discusses the part played by alkaloids in the economy of plant life and points out that they are now generally considered as being largely waste products.—*Drug Topics*, New York, 1907, v. 22, p. 97.

Schmidt and Meyer discuss the movement of alkaloids in various portions of plants and suggest several problems for further study.—*Arch. d. Pharm.*, 1907, v. 245, pp. 329–336.

Reichard, C. (*Pharm. Centr.*, 48, 44–51), contributes several important suggestions to the knowledge of alkaloid reactions.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 894.

Fetterolf, Daniel W., discusses the application of the Lloyd reaction for alkaloids, and reviews the literature, a list of the contributions being included.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 317.

Riedel's *Berichte* (Berlin, 1907, pp. 60–70), discusses the characterization of the more widely used anesthetics and of several well-known alkaloids by noting the crystalline structure and the melting point of picrates precipitated from more or less dilute solutions.

Pozzi-Escot, Emm., describes a double iodide of bismuth and strychnine, and a double iodide of bismuth and cocaine, which are claimed to offer good microchemical tests for strychnine and cocaine, respectively.—*Ann. de chim. analyt. Par.*, 1907, v. 12, pp. 357–358.

von Pflugk discusses the uses of oil solutions of alkaloids as recommended by Panas and Scrini.—*Pharm. Ztg.*, Berlin, 1907, v. 52, p. 806.

6. ASSAY PROCESSES.

Rammstedt, Otto, reviews, chronologically, the methods of alkaloidal assay from the discovery of morphine by Sertürner to the present time.—*Apoth. Ztg.*, Berl., 1907, v. 22, pp. 1067–1069, 1081–1083, 1103–1104, 1117–1119.

Puckner, W. A., reviews the literature relating to the estimation of alkaloids for the year 1906 and the reasons for the unusual interest and activity in connection with alkaloidal assays in this country.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 383–400. (See also *Pharm. Rev.*, Milwaukee, 1907, v. 25, pp. 303–312, 321–331.)

Rusby, H. H., asserts that in providing assay processes the *Pharmacopœia* has in many instances gone contrary to its best light, inaccurate processes having been introduced when perfected and accurate ones were available. "Although it is irritating to those who are obliged to share the responsibility, it is not just to charge these failures against the subject, when they belong only to its administration."—*Drug. Circ.*, N. Y., 1907, v. 51, p. 299.

Gane, E. H., summarizes the report on alkaloidal assays of the committee on U. S. P., and points out that the range of difference is altogether too great to permit of positive statements being made on the report of any one chemist.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 315.

Lyons, A. B., asserts that the U. S. P. assay processes are generally sound in principle, and only in a few instances need modification, in some details, to make them practical.—*Ibid.*, v. 55, p. 63.

A symposium on the assay processes of the U. S. P. VIII is continued in the *Am. Druggist*, N. Y., 1907, v. 50, p. 8.

Kebler, Lyman F., points out that in view of the legal status conferred upon the U. S. P. VIII it appeared desirable to study all of the plant drug assays contained therein. He outlines the program that was followed and records some of the work that has been done.—*Proc. Ass., Off. Agric. Chem.*, 1907, 24th Ann. Convention, p. 81. (*Bull. Bur. Chem. U. S. Dept. Agric.*, 1908, No. 116.)

Lyons, A. B., points out a number of weak points in the official alkaloidal assays, and also points out that those who have had the most experience in the use of assay processes will agree that few of them can be expected to yield in the hands of different manipulators results that will agree closely.—*Am. Druggist*, N. Y., 1907, v. 50, p. 68.

Good, J. M., points out that in connection with assay work the personal element is important and that while the details in each process are quite explicit the results will be considered reliable only when obtained by experts in such work.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 64.

Naylor, W. A. H., in discussing the U. S. P. assays for galenicals, points out that in several instances the percentage of alkaloid is determined by the titration of an unweighed residue. He believes that this method of procedure is not free from certain defects, and in some cases would tend to give too high results.—*Am. Druggist*, N. Y., 1907, v. 50, p. 355. (See also Naylor and Chappel, *Pharm. J. Lond.*, 1907, v. 24, p. 393.)

Bougault, J., thinks that the descriptions of assay processes in *Ph. Belg.* III, while admirably concise, lack that particularity which would tend to utility and uniformity.—*J. de pharm. et de chim. Par.*, 1907, v. 25, pp. 244–250.

van der Haar, A. W., presents a theoretical and practical study of the methods of quantitative assay of alkaloids in drugs and preparations that have been included in the *Ph. Ndl.* IV. Published as a separate, referred to in *Pharm. Weekbl.*, 1907, v. 44, p. 1377.

Wulff, C., reviews the assay methods of the *Ph. Austr.* VIII, enumerates the drugs for which assay methods are included, and compares the methods with those official in the *Ph. Germ.* IV.—*Apoth. Ztg.*, Berl., 1907, v. 22, pp. 1032–1033.

Caesar and Loretz (*Geschäfts Ber.*, 1907, p. 75) outline a number of modifications for the official *Ph. Germ.* IV methods of assay and describe some simple apparatus that will be found useful in this connection.

Webster, M. H., outlines a general method of assay for galenical preparations, which depends on the precipitation of the contained ammonia, gum and albuminous matter with absolute alcohol acidified with tartaric acid, evaporating the resulting filtered solution and treating with acidified water to get rid of the chlorophyll, resins and fat; the acid solution, after being filtered, is made alkaline and washed out with a mixture of chloroform and ether; add an excess of N/50 or N/100 sulphuric acid. Separate and titrate back with N/50 sodium hydroxide, using cochineal as the indicator.—*Am. J. Pharm.*, Phila., 1907, v. 79, pp. 299-307.

Matthes and Rammstedt discuss the use of picrolonic acid (dinitrophenylmethylpyrazolon) as a precipitant for alkaloids, review some of the literature relating to work done with this reagent, and record some of their own work in this direction.—*Ztschr. f. anal. Chem.*, Wiesb., 1907, v. 46, pp. 565-574. (See also *Arch. d. Pharm.*, 1907, v. 245, pp. 112-132.)

Warren and Weiss report some experiments on the use of picrolonic acid as a precipitant for alkaloids; also present a number of illustrations showing the characteristic crystals of picrolonates of the several alkaloids.—*Journ. Biol. Chem.*, N. Y., 1907, v. 3, pp. 327-338.

Naylor, W. A. H., discusses the assay of galenicals, the chief features which ought to characterize an ideal method of assay, and the difficulty of devising a process which shall satisfy the several requirements.—*Pharm. J.*, Lond., 1907, v. 24, pp. 392-393.

Riedel, J. D. (*Pharm. Zeit.*, LII, p. 292), has found that most of the local anesthetics, such as stovaine, novocaine, alypin, scopolamine, anesthesin, etc., as well as several of the frequently employed alkaloids, afford, with picric acid, easily crystallizable picrates possessing not only characteristic crystalline forms, but definite melting points as well.—*Merck's Report*, N. Y., 1907, v. 16, p. 290.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 12) points out that in shaking out mixtures with chloroform in chloroform containing liquids the frequently resulting emulsion can readily be broken up by stirring the mixture with a medium thin wire. Chloroform solutions that are intended to be evaporated frequently contain mechanical impurities, and he suggests filtration. This can readily be accomplished by placing a pledget of cotton in the tube of the separating funnels.

Parker, C. E., describes and figures a mechanical agitator for use in drug assay work.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 497-499.

7. PHYSIOLOGICAL STANDARDIZATION.

An editorial calls attention to the evidence given by Cushny on the pharmacodynamic action of drugs and points out the importance of such experimental inquiry.—*Pharm. J.*, Lond., 1907, v. 24, p. 717.

Wilson, J. Beetham, discusses the standardization of galenicals and asserts that if we consider who are the advocates for standardization its utility appears to be doubtful.—*Ibid.*, v. 25, p. 695.

Lenton, Walter H., in discussing standardization points out that many of those who oppose standardization of galenicals on the supposition that its advocates leave human idiosyncrasies out of their reckoning lose sight of the fact that standardization at least eliminates one element of uncertainty.—*Ibid.*, v. 25, p. 730.

Wilson, J. Beetham, believes that in view of the fact that medicine is not an exact science he can not see any reason for the introduction of standardization of natural drugs.—*Ibid.*, v. 25, p. 770.

Chassevant, Chevalier, Brissemoret, and Pouchet contribute a brief but interesting discussion on the physiologic action of plant extracts, as compared with that of their crystalline principles.—*J. de pharm. et de chim. Par.*, 1907, v. 25, pp. 410-411.

An editorial calls attention to some recent work by Edmunds on the standardization of cardiac remedies, and points out that as matters now stand the physiological assay is made by the physician at the bedside. He gives the drug for a reasonable time, perhaps, and then has to increase the dose until the desired results are attained. No amount of standardization would ever do away with his ascertaining the physiological dose for the individual patient, but it would certainly shorten the process and avoid the loss of much valuable time which may mean life or death to the patient.—*Pharm. J., Lond.*, 1907, v. 25, p. 808.

Korndoerfer, Augustus, asserts that experiments on the lower order of animals are too commonly depended upon in determining the therapeutic action of drugs on man, despite the fact that such experiments must prove unsatisfactory and misleading by reason of the varied functional reactions to the same drug in different classes of animals.—*Hahnemann. Month.*, Phila., 1907, v. 42, pp. 561-566.

7. PHARMACEUTICAL PREPARATIONS.

The committee on the U. S. P. of the American Medical Association considers it a distinct mistake not to print after each drug its official preparations, as failure to do this causes the physician constant annoyance.—*Pharm. J. Lond.*, 1907, v. 25, p. 197.

At the end of each monograph descriptive of drugs or chemicals, the *Ph. Helv.* IV includes a list of the preparations in which the article constitutes one of the active ingredients.

The *Ph. Dan.* VII under the index of Latin names of drugs or chemicals includes a list of preparations of which the particular drug or chemical is an active constituent.

A symposium on the galenical preparations of the U. S. P. VIII, held at the meeting of the Missouri Pharmaceutical Association, 1907, is reported.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, pp. 282-286.

Fleischmann, C., discusses the relative desirability of purchasing or making of galenical preparations, and points out that quality is practically the only question to be considered, and from this point of view the pharmacist will usually find it to be to his advantage to make many, if not all, of the official galenical preparations.—Schweiz. Wchnschr. f. Chem. ü. Pharm. Zürich, 1907, v. 45, pp. 98–99.

Whelpley, H. M., discusses the identification of pharmaceutical preparations and enumerates the physical properties to be considered in this connection.—Proc. Missouri Pharm. Ass., 1907, pp. 100–104.

Wilbert, M. I., points out that many of the formulas contained in the National Formulary are representative of the poly-pharmacy of bygone centuries, and have no legitimate reasons for existence at the present time.—Am. J. Pharm., Phila., 1907, v. 79, p. 207.

England, Joseph W., is reported as asserting that the ready-made formula is usually badly “balanced” therapeutically, as, for example, the elixir of phosphorus and nux vomica, N. F.—J. Am. M. Ass., 1907, v. 49, p. 349.

Scoville, Wilbur L., discusses quality as a prime factor in the making of pharmaceutical preparations and calls attention to the need for providing both artistic as well as therapeutically active medicinal preparations.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 161–165.

Fisk, Frank E., discusses the use of heat in the pharmaceutical laboratory and its use in the making and dispensing of preparations.—*Ibid.*, v. 55, pp. 191–196.

Hallberg, C. S. N., discusses the cerates, ointments, plasters, and suppositories of the Pharmacopœia.—J. Am. M. Ass., 1907, v. 48, pp. 1737–1739.

Lyons, A. B., points out that it is not an easy matter to declare off-hand what proportion of alcohol we may expect to find in official fluid extracts, and points out some of the factors that are involved in estimating this percentage content.—Am. Druggist, N. Y., 1907, v. 50, p. 67.

An editorial comments on the necessity of publishing some authoritative standards of percentages of alcohol for official fluid extracts and points out that in the absence of an official table of percentage strengths manufacturers are compelled to approximate the amounts and in most instances the figures given are too high.—*Ibid.*, v. 50, p. 33.

Beringer, George M., proposes the term “fluid glycerate” as a distinct title for a type of what is proposed as a new class of liquid pharmaceutical preparations made with glycerin or mixtures of glycerin and water as solvents and of the same drug strength as the official fluid extracts, namely, 1 gm. of the drug to each cubic centimeter of the product, and it is believed that a number of such preparations can be made.—Proc. New Jersey Pharm. Ass., 1907, p. 56.

Graham, George A., Tedesche, Leon G., Lamy, Anthony W., Simpson, Maxwell S., Matthews, Aber, C., Macatee, H. C., Lofton, Lucius, discuss the pharmacopœial preparations to be kept on hand by general practitioners.—N. York M. J., 1907, v. 85, pp. 1179–1182, 1216–1220.

1. GENERAL FORMULAS.

Weichelt, W., believes that all of the several accepted forms of medicaments should be represented in the Pharmacopœia by a general formula or definition. Among the forms enumerated by him are: Aceta, aquæ, bacilli medicamentosi, balsamum, boli, candelæ, cerata, chartæ, conservæ, including electuaria, decocta, elæosacchara, elixiria, emulsiones, essentia, extractæ, extracta fluida, gelatinæ, infusa, liquores, mucilagines, olea, pastæ, pilulæ, saponess medicati, saturationes, spirituosæ, syrapi, unguenta, vina.—Apoth. Ztg., Berl., 1907, v. 22, p. 667.

An unsigned article gives a description of pastilles and a type formula for preparations of this kind; also includes a description of confections, pastes, and jellies with type formulas.—Pharm. J. Lond., 1907, v. 25, p. 213.

FORMS OF MEDICAMENTS.

Weichelt, W., presents a comprehensive review of the forms of medicaments recognized by the Ph. Germ. IV, the German prescriptions prices, and the Imperial decree of October 22, 1901, regulating the sale of medicines. The articles that are discussed include:

Aceta.	Extracta.	Pulpæ.
Aquæ.	Extracta fluida.	Pulveres.
Bacilli.	Gelatinæ.	Rotulæ.
Balsamum.	Globuli.	Salia.
Boli.	Glyceratum, Glycerolat- um.	Saponess.
Candelæ fumales.	Guttaplastæ.	Saponimenta vide Lin- imenta.
Capsulæ.	Infusa.	Saturationes.
Cataplasmata.	Lanollimenta et Lanoll- imenta extensa.	Syrapi.
Cerata.	Linimenta.	Solutiones vide Liquores.
Cereoli.	Liquores, Mixturæ, Solu- tiones.	Species.
Chartæ.	Mel.	Spirituosa.
Collemplastra vide Em- plastra.	Mixtura vide Liquores.	Stylli vide Bacilli.
Collodia.	Mucilagines.	Succi.
Conservæ.	Olea.	Suppositoria vide Bacilli et Globuli.
Decocta et Infusa.	Oxymel vide Mel.	Tablettæ.
Elæosacchara.	Pastæ.	Tincturæ.
Electuaria.	Pastilli vide Tablettæ.	Unguenta.
Elixiria.	Pilulæ.	Vina.
Emplastra vide Cerata.	Potio vide Saturationes.	
Emulsiones.		
Essentia.		

—Apoth. Ztg. Berl., 1907, v. 22, pp. 638–641, 650–652, 666–668.

2. CHANGES IN STRENGTH.

Thrush, M. C., thinks that the change in strength of such important preparations as tincture of aconite from 35 to 10 per cent, tincture of veratrum from 40 to 10 per cent, and tincture of strophanthus from 5 to 10 per cent, etc., has been absolutely ignored by the great majority of medical practitioners.—P. C. P. Alumni Report, Phila., 1907, v. 43, p. 185.

An editorial discusses the increase of alcoholic strength by precipitation as reported by John Uri Lloyd in the November number of the Eclectic Medical Gleaner.—Am. Druggist, N. Y., 1907, v. 51, p. 353.

3. STANDARDIZATION.

Royce, S., discusses the need for testing pharmaceutical preparations and the quality of the drugs from which they are made, and criticises the present-day practice in British pharmacies.—Pharm. J., Lond., 1907, v. 24, pp. 214–215.

Arzberger, H. (Pharm. Post, 39, 737–738), gives descriptions and qualitative tests for ointments and plasters containing boric acid, potassium iodide, lead acetate, carbonate and oxide, glycerol, naphthalene, mercury, cantharides, etc.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 621.

Philipp Röder, Wien, points out that the exact standardization of tinctures may lead to unexpected precipitation as the addition of dilutions of alcohol to an extract containing preparation will necessarily alter the specific gravity of that preparation and therefore its solvent properties.—Pharm. Post., Wien, 1907, v. 40, p. 307.

4. REQUIREMENTS.

The Ph. Helv. IV describes odor, taste, and color in connection with all substances possessing these characteristics.

The Ph. Dan. VII includes concise requirements as to contents, general appearance, and color of official pharmaceutical preparations.

5. GALENICALS.

Mittelbach, Wm., as chairman of the committee on the U. S. P., presents a comprehensive review of the galenicals of the U. S. P. VIII, contributed to by a number of members.—Proc. Missouri Pharm. Ass., 1907, pp. 130–138.

A book review calls attention to the history, pharmacy, and practice of compressing medicaments, as outlined by Joseph R. Wood, in a book entitled "Tablet Manufacture."—Nat. Druggist, St. Louis, 1907, v. 37, p. 60.

Good, J. M., expresses the belief that the diminished use of tablet triturates in general practice seems to justify the conclusion that they are a passing fad.—*Ibid.*, v. 37, p. 64.

An abstract (from American Druggist) gives an outline of the history of the capsule industry from the invention of capsules by Mothes to the present time.—*Canad. Druggist*, Toronto, 1907, v. 19, p. 37.

Audenampsen, J., describes and figures an apparatus designed for distillation in vacuo on a small scale.—*Pharm. Weekbl.*, 1907, v. 44, pp. 1378-1380.

Brown, Ernest, enumerates the qualifications that should be possessed by a desirable still and describes and figures an apparatus which he believes embodies the several desirable features.—*Pharm. J. Lond.*, 1907, v. 24, p. 23.

6. DECOMPOSITION.

Dohme, A. R. L., asserts that the more important galenical preparations do not deteriorate perceptibly in course of time. He reports that repeated tests over a period of five years show that fluid extracts, with very few exceptions, do not lose any appreciable amount of alkaloid.—*D.-A. Apoth. Ztg.*, N. Y., 1907, v. 28, p. 133.

An editorial presents a résumé of the discussion on the preservation of galenicals at the recent meeting of the American Pharmaceutical Association.—*Bull. Pharm.*, 1907, v. 21, pp. 30-31.

Robinson, R. A., jr., points out that the Codex directions for the preservation of medicaments might, perhaps, be quoted by local authorities prosecuting drug vendors as a proof of the carelessness of the defendant. They might argue that a chemist and druggist would have the less excuse for carelessness in keeping his drugs from the fact that the "Codex" instructs him how this should be done.—*Pharm. J. Lond.*, 1907, v. 25, p. 509.

Crips, R. A., presents some notes on the deterioration of pharmaceutical preparations by long storage. From his results it would appear that, except for prolonged periods, a corked bottle is not inferior to a stoppered one, and therefore "inspectors' samples" can scarcely be questioned on this ground alone.—*Ibid.*, v. 24, p. 519.

Bruder, Otto E., discusses the preservation of drugs and calls attention to a practical application of the pharmacist's theoretical knowledge to prevent deterioration of drugs and medicinal preparations, and gives some additional suggestions on practical methods to be followed in the preservation of drugs.—*Pharm. Era*, 1907, v. 37, p. 275.

The Ph. Dan. VII includes a list of articles that are to be carefully preserved free from light or preserved in a poison cabinet. It also includes a list of drugs that are not to be kept longer than one year, and enumerates the drugs that are to be kept on hand at least one year before using.

7. INCOMPATIBILITY.

Robinson, William J., discusses a number of incompatibilities and points out the more desirable method of procedure in connection therewith.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 185, 191.

8. PERCOLATION.

Brandel and Kremers continue their review of percolation and present a comprehensive bibliography giving the name of the author, the date, and a short abstract of the contents of the papers bearing on this subject.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, pp. 92-96, 116-120, 242-245, 273-275, 317-320.

Caldwell, Paul, describes and illustrates a method for filtering liquids at low temperatures.—*Drug. Circ.*, N. Y., v. 51, p. 293.

9. EXTRACTION.

Eliel, Leo, discusses the possible application of circulatory displacement, and describes an apparatus used by him for this purpose.—*Proc. Indiana Pharm. Ass.*, 1907, pp. 17-18.

Forbing, John W., describes and illustrates an automatic extraction apparatus designed by him, and recalls the principles embodied in the Soxhlet and other extraction apparatus employed in experimental operations, but here applied to manufacturing on a large scale.—*Am. Drugg.*, 1907, v. 51, pp. 357-358.

10. STERILIZATION.

The *Ph. Helv.* IV gives detailed directions for sterilizing glass and metal articles, medicinal solutions, emulsions, and surgical dressings.

Grübler, M., discusses the requirements for sterilization that are made in the *Ph. Austr.* VIII, the use of sterilizing apparatus and the practicability of testing the sterility of substances and solutions for freedom from micro organisms.—*Pharm. Post*, Wien, 1907, v. 40, pp. 2-5, 303-304.

Also points out the need for examining prescription vials that are to contain solutions of alkaloids, particularly if these solutions are to be sterilized.—*Ibid.*, v. 40, pp. 579-582.

Stich, Conrad, outlines a method for sterilizing prescriptions, particularly solutions for hypodermic use.—*Pharm. Ztg. Berl.*, 1907, v. 52, p. 706.

Saporetti, Umberto (*Bollet. Chemic. Farmaceut. Fasc.* 1907, p. 645), discusses the use of the autoclave, for sterilizing, and points out some of the disadvantages of this apparatus. He records experiments made by sterilizing without apparatus, by simply boiling at ordinary atmospheric pressure.—*Ibid.*, v. 22, p. 891.

Wiesenthal, W., discusses the sterilization of substances used in the practice of medicine, and points out that the knowledge of bacteriology possessed by the average apothecary must be enlarged upon if the apothecary of the future is to retain, as he should, the scientific status now occupied by members of that profession.—*Pharm. Zentralh.*, 1907, v. 48, pp. 551-553.

11. FORMS OF ADMINISTRATION.

An unsigned article discusses the dispensing of various forms of medicaments including cachets, capsules, pills, ointments, and mixtures.—*Pharm. J. Lond.*, 1907, v. 25, pp. 100–101. 182–183, 262–263, 289–290, 328–329.

AMPOULES.

Pégurier, G., discusses the use of ampoules for dispensing solutions of apomorphine hydrochloride and of morphine hydrochloride.—*Répert. de pharm. Par.*, 1907, v. 19, pp. 299–301, 442–443.

In this connection, see also Grübler (*Pharm. Post*, 1907, p. 579) on the assay of glass intended for ampoules containing alkaloids.—*Ibid.*, v. 19, p. 504.

CACHETS.

An unsigned article describes cachets, their preparation and method of administration.—*Pharm. J. Lond.*, 1907, v. 25, p. 101.

Smith, Rufus E., discusses the use of wafers and cachets as mediums for exhibiting medicines.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 165–168.

He describes and figures a new appliance for the filling and sealing cachets.—*Am. Druggist*, N. Y., 1907, v. 51, p. 274.

CAPSULES.

An unsigned article discusses the filling of capsules and the use of capsules as a medium for masking the disagreeable taste of medicines.—*Pharm. J. Lond.*, 1907, v. 25, p. 101.

COMPRESSED TABLETS.

Thomann, J., points out that the *Ph. Helv.* IV includes a general description and formulæ for compressed tablets, and provides that substances insoluble in water must include starch or a similarly acting substance to facilitate disintegration.—*Schweiz. Wchnschr. f. Chem. u. Pharm.*, Zürich, 1907, v. 45, p. 747.

An unsigned article discusses the making of compressed tablets, the tablet machine, and the condition of the material that is suitable for the preparation of tablets.—*Pharm. J.*, Lond., 1907, v. 25, pp. 182–183.

Harnack, Erich, discusses some of the advantages of compressed tablets and points out that they are reliable, practical, easily produced, and not expensive.—*Therap. Monatsh.*, Berl., 1907, v. 21, pp. 499–502.

Some further observations in reply to a criticism published in the *Apotheker Zeitung* (XXII, No. 82), *Ibid.*, v. 21, pp. 635–638.

Thomann reviews the objections to compressed tablets and tabloids that are being evidenced, and points out that on the one hand

these preparations have been found to pass through the body without disintegrating and on the other hand may, because of the concentrated form of the medicament, prove to be irritating and even harmful in the stomach.—Schweiz. Wchnschr. f. Chem. u. Pharm., Zürich, 1907, v. 45, p. 44.

Hallberg, C. S. N., calls attention to the possible abuse of compressed tablets, in that dosage forms of medicines are not readily controlled or examined as to their identity or purity.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 177–178.

A book review calls attention to a volume of 224 pages on tablet manufacture, its history, pharmacy, and practice, by Joseph R. Wood, published by J. B. Lippincott Company.—Drug. Circ., N. Y., 1907, v. 51, p. 430.

TABLET TRITURATES.

Good, James M., in discussing the additions to the U. S. P. VIII, says that of the preparations which have been popular for several years it will be noticed that tablet triturates are conspicuous by their absence from the Pharmacopœia. He believes that in a limited way these preparations meet a reasonable demand, but the diminished use of them in general practice seems to justify the conclusion that they are a passing fad.—Pharm. Era., N. Y., 1907, v. 37, p. 80.

12. METHODS OF ADMINISTRATION.

Tuffier and Mauté experimenting with trypanroth, silver, and salicylic acid on guinea pigs and rabbits, conclude that medicaments may be introduced by aid of the constant current through the healthy skin, where they are absorbed more or less rapidly; that they seem to form in the cellular protoplasm combinations more or less soluble and different from those which are present when they are introduced subcutaneously, and that their penetration appears to remain superficial.—Compt. rend. Soc. de biol., Par., 1907, v. 62, pp. 64–66.

Iscovesco and Matza give the results of their experiments on this subject.—*Ibid.*, v. 62, pp. 182–184.

Maurel, E., discusses the influence of the principle paths of administration (gastric, hypodermic, intravenous, etc.) on the minimal lethal dose of active medicaments in the frog and the rabbit.—*Ibid.*, v. 62, pp. 897–899.

Bancroft, F. W., reports observations on the relative efficiency of the various methods of administering saline purgatives.—J. Biol. Chem., N. Y., 1907–1908, v. 3, pp. 191–211.

II. INTERNATIONAL STANDARDS.

1. INTERNATIONAL CONFERENCE FOR THE UNIFICATION OF PHARMACOPŒIAL FORMULÆ FOR POTENT MEDICAMENTS (BRUSSELS CONFERENCE.)

1. PROJET D'ARRANGEMENT.

An editorial comments on the unification of potent remedies provided for by the international convention held in Brussels in 1902, and gives a list of the governments that have ratified the articles of the convention; also enumerates some of the regulations.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 177.

An editorial points out that the international agreement respecting the unification of the pharmacopœial formulas for potent drugs, which was signed at Brussels on November 29, 1906, has now been presented to Parliament and published. (London, Harrison & Sons, St. Martin's Lane, Price 1½d.)—Pharm. J., Lond., 1907, v. 24, p. 387.

Bührer, C., reviews the degree of compliance with the protocol of the Brussels conference evidenced by the recently published pharmacopœias. To obtain this degree of compliance the Ph. Belg. modified 80 per cent of the formulas, the Ph. Hisp. 75 per cent, the Ph. Ndl. 39 per cent, while the Ph. Austr., because of the general compliance of its formulas with the requirements of the international protocol, was compelled to change but 6 per cent of the formulas.—Schweiz. Wehnschr. f. Chem. u. Pharm., Zürich, 1907, v. 45, p. 418.

Greenish, Henry G., presents a review of modern pharmacopœias and the international agreement and points out the extent to which the several recently published pharmacopœias differ from the protocol of the Brussels conference. He expresses regret that the U. S. P. does not comply more closely with these requirements.—Pharm. J., Lond., 1907, v. 24, pp. 832-833.

MacAllister, Donald, the president of the general medical council, in an address at the eighty-fifth session of the council, referring to the adoption in the Ph. Brit. of the international agreement respecting the unification of the pharmacopœial formulas for potent drugs, said:

The changes involved may not in all cases be deemed improvements, and if our own insular convenience alone were in question might not at once be approved; but they are probably fewer and less important than other countries

will be constrained under the agreement to make in the common interest of all. The reservation to introduce such modifications in detail as medical and pharmaceutical progress may render necessary, enables the council, as the authority statutorily responsible for the Ph. Brit. to modify the latter while observing the spirit of the agreement, so as to keep pace with the progress of medical and pharmaceutical science. The committee of reference in pharmacy have had the agreement under consideration and have presented to the pharmacopœia committee a valuable report on the changes required to give it effect.—*Drug. & Chem., Lond., 1907, v. 70, p. 844.*

Good, J. M., believes that the wisdom of adopting international standards for potent medicaments needs little argument and calls attention to some of the changes made, in strength of U. S. P. tinctures.—*Nat. Druggist, St. Louis, 1907, v. 37, p. 63.*

A review of progress in pharmacy reports the acceptance of the protocol of the Brussels conference as a diplomatic document and reproduces the protocol entire, with some additional comments.—*Pharm. Ztg., Berl., 1907, v. 52, pp. 860-861.*

An editorial comments on the proposed international medicine standards, points out the standards that are at variance in the Ph. Brit., and comments favorably on the proposal to include the international standards in the coming edition of the Ph. Brit.—*Chem. & Drug., Lond., 1907, v. 70, p. 484.*

"Gnomon" discusses the international agreement respecting the unification of pharmacopœial formulas for potent drugs, and believes that it is not likely to lead to practical results of a far-reaching character in what it is customary to call the "English-speaking" countries.—*Pharm. J., Lond., 1907, v. 25, p. 10.*

An abstract calls attention to the interest that is being taken in the proposed international unification of official formulas for potent medicaments, and expresses the belief that due respect will be given by the British Government to the decisions that may be arrived at on the subject by the various British communities throughout the world.—*Australas. J. Pharm., Melbourne, 1907, v. 22, p. 68.*

An unsigned article commenting on the promulgation of the international protocol points out that the importance of this act must be apparent to all pharmacists. The requirements are reasonable and in keeping with rational advance and progress.—*Pharm. Ztg., Berl., 1907, v. 52, p. 361.*

The Belgian Academy of Medicine, at a session devoted to a discussion of the discrepancies in the official pharmacopœias in use in the different countries, adopted a resolution recommending the Government to take steps toward the formation of an international commission having for its object the establishment of a permanent bureau to work for greater consistency in this respect.—*Med. Rec., N. Y., 1907, v. 71, p. 607.*

Schamelhout, A., comments on the international agreement for the unification of formulas of potent medicaments and the possible development of an international secretariat for the unification of pharmacopœias.—Bull. Soc. roy. de pharm., Brux, 1907, v. 51, pp. 113–121.

An unsigned article discusses the efforts that have been made by the countries to comply with the protocol of the Brussels conference of 1902, and points out that in order to secure so desirable an end as the uniformity of standards throughout the world it seems that it might have been just as well, while revision was in progress, to have made all changes that were necessary for unification and be done with it. It stands to reason that the same term should mean the same thing everywhere; that a medicine called by a certain name in several countries should in all of them at least represent the identical strength of drug or drugs contained in it.—Nat. Druggist, St. Louis, 1907, v. 37, p. 308.

Beringer, George M., points out that the desire to establish international standards for medicines is certainly a very laudable one, and it can not be considered as wise or as encouraging to such a purpose to unnecessarily modify or alter satisfactory formulas of any foreign authority.—Am. J. Pharm., Phila., 1907, v. 79, p. 363.

The protocol of the Brussels conference is reprinted in the Ph. Helv. IV, which designates the titles by the addition of (P. I.).

The Ph. Dan. VII designates all of the preparations included in the Brussels conference protocol by stating immediately under the main title (*Formula internationalis*) practically all of the requirements of the protocol being complied with.

In the appendix to the same pharmacopœia the protocol of the Brussels conference is reprinted.

2. COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1907 WITH THE PROVISIONS OF THE BRUSSELS CONFERENCE.

	Protocol, International.	B. P. C.	Ph. Helv. IV.	Ph. Dan. VII.
Aconitum napellus (L):				
Title.....	Aconiti tuber seu Tuber Aconiti..	Aconiti Radix.....	Tuber Aconiti.....	Not official.
Requirement.....	Tuber of the current year.....	Origin, general characteristics, daughter bulb.	Aconiti tuber seu Tuber Aconiti (P. I.). Same as P. I., origin, general and microscopic characteristics.	
Tinctura aconiti:				
Title.....	Aconiti tinctura seu Tinctura Aconiti.	Tinctura Aconiti.....	Tinctura Aconiti.....	
Strength.....	10 per cent.....	5 gm. in 100 cc.....	Aconiti tinctura seu Tinctura Aconiti (P. I.).	
Menstruum.....	Alcohol (70 per cent).....	Alcohol (70 per cent).....	10 per cent.....	
Requirement.....	0.05 per cent of total alkaloids.		Same as P. I. Appearance, taste, solubility in water, assay and chemical test.	
Atropa belladonna (L):				
Title.....	Belladonnæ folium seu Folium Belladonnæ.	Belladonnæ Folia.....	Folium Belladonnæ.....	Folia Belladonnæ.
Requirement.....	Use only the leaf dried.....	Leaves and young branches about 0.4 per cent alkaloids.	Belladonnæ folium seu Folium Belladonnæ (P. I.). Same as P. I., origin, general and microscopic characteristics, assay (0.35 per cent alkaloids) limit of ash (15 per cent).	Belladonnæ Folium seu Folium Belladonnæ. Same as P. I. General and microscopic characteristics. May be kept one year.
Tinctura belladonnæ:				
Title.....	Belladonnæ tinctura seu Tinctura belladonnæ.	Tinctura Belladonnæ..... (Made from belladonna root.)	Tinctura Belladonnæ.....	Not official.
Strength.....	10 per cent.....		Belladonnæ tinctura seu Tinctura Belladonnæ (P. I.).	
Menstruum.....	Alcohol (70 per cent).....		Same as P. I.	
Requirement.....			Same as P. I. Color, odor, taste, solubility, assay, chemical test.	

Extractum Belladonnae:			
Title.....	Extractum Belladonnae Extractum.	Extractum Belladonnae (Formula Internationalis) Belladonnae extractum.	Extractum Belladonnae (Formula Internationalis) Belladonnae extractum.
Requirement.....	Solid extract (containing about 10 per cent of water) made with alcohol (70 per cent).	1 per cent alkaloids.....	Same as P. I. Color, solubility, reaction, assay (1.5 per cent alkaloids).
Colchicum autumnale (L):			
Title.....	Colchici semen seu Semen Colchici.	Colchici Semina.....	Semen Colchici.....
Requirement.....	Use only the seed.....	General characteristics, taste, 0.7 per cent of colchicine.	Same as P. I., general structural characteristics, taste and chemical reaction.
Tinctura Colchici:			
Title.....	Colchici tinctura seu Tinctura Colchici.	Tinctura Colchici Seminum.....	Tinctura Colchici (Formula Internationalis) Colchici tinctura.
Strength.....	10 per cent.....	20 gm. in 100 cc.....	Same as P. I.
Menstruum.....	Alcohol (70 per cent).....	Alcohol (45 per cent).....	Same as P. I.
Requirement.....			Appearance and behavior with water.
Digitalis purpurea (L):			
Title.....	Digitalis folium seu Folium Digitalis.	Digitalis Folia.....	Folia Digitalis. Digitalis folium seu Folium Digitalis.
Requirement.....	The leaf of the 2nd year.....	General characteristics.....	General and microscope structure. May be kept one year.
Tinctura Digitalis:			
Title.....	Digitalis tinctura seu Tinctura Digitalis.	Tinctura Digitalis.....	Tinctura Digitalis (Formula Internationalis) Digitalis tinctura.
Strength.....	10 per cent.....	12.5 gm. in 100 cc.....	Same as P. I.
Menstruum.....	Alcohol (70 per cent).....	Alcohol (60 per cent).....	Same as P. I.
Requirement.....			Color, odor, taste, and behavior with water.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1907, ETC.—Continued.

	Protocol, International.	B. P. C.	Ph. Helv. IV.	Ph. Dan. VII.
<i>Uragoga Ipecacuanhæ</i> (Baill.): Title.....	<i>Ipecacuanhæ radix seu Radix Ipecacuanhæ.</i>	<i>Ipecacuanhæ Radix</i>	<i>Radix Ipecacuanhæ</i> <i>Ipecacuanhæ radix seu Radix Ipecacuanhæ</i> (P. I.).	<i>Radix Ipecacuanhæ.</i>
Requirement.....	Only the root bark to be used. The powder to have an alkaloidal strength of 2 per cent.	Rio Ipecac, general characteristics...	Same as P. I., general and microscopic characteristics, assay, chemical test limit of ash (not more than 4 and not less than 1.8 per cent alkaloids).	Same as P. I., general and microscopic characteristics, chemical test.
<i>Tinctura Ipecacuanhæ:</i> Title.....	<i>Ipecacuanhæ tinctura seu Tinctura Ipecacuanhæ.</i>	Not official.....	<i>Tinctura Ipecacuanhæ</i> <i>Ipecacuanhæ tinctura seu Tinctura Ipecacuanhæ</i> (P. I.).	Not official.
Strength.....	10 per cent.		Same as P. I.	
Menstruum.....	Alcohol (70 per cent)		Same as P. I.	
Requirement.....			Color, odor, taste, assay (0.2 per cent total alkaloid) chemical test.	
<i>Syrupus Ipecacuanhæ:</i> Title.....	<i>Ipecacuanhæ sirupus seu Sirupus Ipecacuanhæ.</i>	<i>Syrupus Ipecacuanhæ</i>	<i>Sirupus Ipecacuanhæ</i> <i>Ipecacuanhæ sirupus seu Sirupus Ipecacuanhæ</i> (P. I.).	Not official.
Strength.....	10 per cent of the tincture.	About 2 per cent.....	Same as P. I.	
<i>Hyoscyamus Niger</i> (L.): Title.....	<i>Hyoscyami folium seu Folium Hyoscyami.</i>	<i>Hyoscyami Folia</i>	<i>Folium Hyoscyami</i> <i>Hyoscyami folium seu Folium Hyoscyami</i> (P. I.).	<i>Folia Hyoscyami.</i> <i>Hyoscyami folium seu Folium Hyoscyami.</i>
Requirement.....	Use only the leaf	Fresh leaves, flowering tops and branches; general characteristics. From 0.05 to 0.14 per cent of alkaloids.	Same as P. I., origin, general and microscopic characteristics.	General and microscopic characteristics; limit for ash; may be kept one year.

Tinctura Hyocyami:					
Title.....	Hyocyami tinctura seu Tinctura Hyocyami.	Tinctura Hyocyami.	Not official.	Not official.	
Strength.....	10 per cent.	10 gm. in 100 cc.			
Menstruum.....	Alcohol (70 per cent).	Alcohol (45 per cent).			
Extractum Hyocyami:					
Title.....	Hyocyami extractum seu Extractum Hyocyami.	Extractum Hyocyami Extractum.	Extractum Hyocyami.	Extractum Hyocyami.	(Formula Internationalis) Hyocyami extractum.
Menstruum.....	Alcohol (70 per cent).	Alcohol (70 per cent).	Same as P. I.	Same as P. I.	Color, solubility, test for alkaloids.
Requirement.....	Solid extract (containing about 10 per cent of water).				
Strychnos nux vomica (L):					
Title.....	Strychni semen seu Semen Strychni seu Nux vomica.	Nux Vomica.	Semen Strychni.	Semen Strychni seu Strychni semen seu Nux vomica.	Same as P. I., general and microscopic characteristics, taste.
Requirement.....	2.5 per cent total alkaloids.	General characteristics; average seeds contain from 2.5 to 3 per cent of total alkaloids.			
Tinctura nucis vomice:					
Title.....	Strychni tinctura seu Tinctura Strychni; Nucis vomice tinctura seu Tinctura Nucis vomice.	Tinctura Nucis vomice.	Tinctura Strychni.	Tinctura Nucis vomice.	(Formula Internationalis) Strychni tinctura seu Tinctura Strychni.
Strength.....	10 per cent.	16.66 per cent.	Same as P. I.	Same as P. I.	
Menstruum.....	Alcohol (70 per cent).	Alcohol about (70 per cent).	Same as P. I.	Same as P. I.	
Requirement.....	0.25 per cent total alkaloids.	From 0.24 to 0.26 per cent w/v of strychnine.	Same as P. I., color, taste, assay.	0.225 to 0.275 per cent total alkaloids; color, behavior, and taste.	
Extractum Nucis vomice:					
Title.....	Strychni extractum seu Extractum Strychni; Nucis Vomice extractum seu Extractum Nucis vomice.	Extractum Nucis Vomice.	Extractum Strychni.	Extractum Nucis Vomice.	(Formula Internationalis.) Strychni extractum seu Extractum Strychni.
Menstruum.....	Alcohol (70 per cent).	Alcohol about 70 per cent.	Same as P. I.	Same as P. I.	
Requirement.....	16 per cent total alkaloids.	5 per cent of strychnine.	Same as P. I., color, taste, and solubility.	15 to 17 per cent total alkaloids; color, solubility, and taste.	

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1907, ETC. (Continued.)

	Protocol, International.	B. P. C.	Ph. Helv. IV.	Ph. Dan. VII.
Opium:				
Title.....	Opil pulvis seu Pulvis Opil.....	Opium.....	Opium.....	Opium.
Requirement.....	Powder to be dried at 60° C.; morphine 10 per cent.	Origin, general characteristics, moisture, extract, from 9.5 to 10.5 per cent of morphine.	Opil pulvis seu Pulvis Opil. (P. I.) Same as P. I., origin, appearance, and assay.	To be dried at 60° C.; general and microscopic characteristics; 9.5 to 10.5 per cent morphine.
Extractum Opil:				
Title.....	Opil Extractum seu Extractum Opil.	Extractum Opil.....	Extractum Opil.....	Not official.
Requirement.....	Morphine, 20 per cent.....	Aqueous extract; about 20 per cent of morphine.	Opil extractum seu Extractum Opil. (P. I.) Color, solubility, assay same as P. I....	
Tinctura Opil:				
Title.....	Opil tinctura seu Tinctura Opil.....	Tinctura Opil.....	Tinctura Opil.....	Tinctura Thebala.
Strength.....	10 per cent.....	7.5 gm. in 100 cc.....	Opil tinctura seu Tinctura Opil. (P. I.)	(Formula Internationalis.) Opil tinctura seu Tinctura Opil.
Menstruum.....	Alcohol (70 per cent).....	Alcohol and water.....	Same as P. I.....	Same as P. I.
Requirement.....	Morphine, 1 per cent.....	About 0.75 per cent w/v of anhydrous morphine.	Same as P. I.....	Same as P. I.
Tinctura Opil crocata:				
Title.....	Opil tinctura crocata seu Tinctura Opil crocata seu Laudanum Sydenhami.	Tinctura Opil Crocata.....	Tinctura Opil crocata seu Tinctura Opil crocata seu Laudanum Sydenhami (P. I.).	Same as P. I.; color, odor, taste, extract content.
Strength.....	10 per cent opium.....	5 gm. in 100 cc.....	Same as P. I.....	Tinctura Thebala (rocata.
Menstruum.....	Morphine 1 per cent.....	Detannated sherry wine.....	Alcohol (70 per cent).....	(Formula Internationalis) Opil tinctura crocata seu Tinctura opil crocata seu Laudanum Sydenhami (Liquidum).
Requirement.....	Morphine 1 per cent.....		Same as P. I.; color, odor, taste, solubility.	Same as P. I.
				Alcohol (70 per cent).
				Same as P. I.; color, odor, taste, extract content.

Pulvis Ipecacuanhæ et Opii: Title.....	Pulvis Ipecacuanhæ Compositus. Opii et Ipecacuanhæ pulvis compositus seu Pulvis Doveri.	Pulvis Ipecacuanhæ opiat. Opii et Ipecacuanhæ pulvis compositus seu Pulvis Doveri (P. I.).	Pulvis Ipecacuanhæ Thebaleus. (Formula Internationalis. Opii et Ipecacuanhæ pulvis compositus seu Pulvis Doveri. Same as P. I.
Requirement.....	To contain 10 per cent of powdered opium.	Opium 10 per cent.....	Same as P. I., color, odor.....
Tinctura Opi Camphorata: Title.....	Opii tinctura benzolea seu Tinctura Opi benzolea.	Tinctura Camphoræ Composita. Tinctura Opi benzolea.....	Tinctura Thebalea benzolea. (Formula Internationalis) Opii tinctura benzolea seu Tinctura Opi benzolea.
Requirement.....	Morphine 0.05 per cent.....	Tincture of opium 6 per cent.....	Color, odor, behavior with water.
Tinctura Strophanthi: Title.....	Strophanthi tinctura seu Tinctura Strophanthi.	Tinctura Strophanthi. Strophanthi tinctura seu Tinctura Strophanthi (P. I.).	Tinctura Strophanthi. Strophanthi tinctura.
Strength.....	10 per cent.....	Same as P. I.....	Same as P. I.
Menstruum.....	Alcohol (70 per cent).....	Same as P. I.....	Same as P. I.
Requirement.....	Seeds not to be freed from fat.	Color taste, behavior with water, chemical test.	Color, taste, limit of taste, and behavior with water.
Sclerotium clavicipitis purpure (Tul) seu Clavicipiti purpure (Tul) Sclerotium: Title.....	Secale cornutum seu Ergotum Secale.	Secale cornutum. Secale cornutum seu Ergotum secale; Sclerotium clavicipitis purpure Tulare seu Clavicipitis purpure Tulare sclerotium. (P. I.)	Secale Cornutum. Ergotum Secale.
Requirement.....	Not to be more than one year old and to be kept whole.	Origin, general characteristics.....	General and microscope characteristics, chemical reaction; may be kept for one year.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1907, ETC.—Continued.

	Protocol, International.	B. P. C.	Ph. Helv. IV.	Ph. Dan. VII.
Extractum Ergotæ:				
Title.....	Secalis cornuti extractum seu Extractum Secalis cornuti; Ergoti extractum seu Extractum Ergoti.	Extractum Ergotæ.....	Extractum secalis cornuti Secalis cornuti extractum seu Extractum Secalis cornuti; Ergoti extractum seu Extractum Ergoti (P. I.).	Extractum secalis cornuti. (Formula Internationalis) Secalis cornuti extractum seu Ergoti extractum seu Extractum Ergoti.
Menstruum & Requirement.	Prepare a watery extract and make up with alcohol (60 per cent).	Alcohol (60 per cent) treated with hydrochloric acid and neutralized with sodium carbonate.	Extracted with chloroform water; treated with alcohol. Color, odor, taste, solubility, chemical test.	Same as P. I.; color and solubility.
Fluidextractum Ergotæ:				
Title.....	Secalis cornuti extractum fluidum seu Extractum fluidum Secalis cornuti; Ergoti extractum fluidum seu Extractum fluidum Ergoti.	Extractum Ergotæ Liquidum.....	Extractum Secalis cornuti fluidum Secalis cornuti extractum fluidum seu Ergoti extractum fluidum seu Extractum fluidum Ergoti (P. I.).	Extractum fluidum Secalis cornuti. (Formula Internationalis) Extractum fluidum Ergoti.
Strength.....	100 per cent.....	100 gm. in 100 cc.....	Same as P. I.....	Same as P. I.
Menstruum.....		Extract with water; treat with alcohol.	Mixture of dilute acetic acid, alcohol, and water.	Alcohol (70 per cent) treated with dilute hydrochloric acid.
Requirement.....			Color, odor, taste, solubility, chemical test, extract.	Color, solubility.
Acidum Hydrocyanicum Dilutum:				
Title.....	Acidum hydrocyanicum dilutum.	Acidum hydrocyanicum dilutum.	Not official.....	Not official.
Requirement.....	Strength 2 per cent.....	2 per cent by weight; color, odor, chemical test.		
Aqua Amygdalæ:				
Title.....	Amygdalæ amarae aqua seu Aqua Amygdalæ amarae.	Aqua Amygdalæ amarae.....	Not official.....	Aqua Amygdalæ amarae concentrata. (Formula Internationalis) Amygdalæ amarae aqua seu Aqua Amygdalæ amarae.

Requirement.....	Strength 0.10 per cent.....	Solution of 0.10 per cent of oil of bitter almonds in water.		Same as P. I.; appearance, chemical reaction, method of keeping.
Aqua Laurocerasi:				
Title.....	Laurocerasi aqua seu Aqua Laurocerasi.	Aqua Laurocerasi.....	Aqua Laurocerasi.....	Not official.
Requirement.....	Strength 0.10 per cent.....	0.1 per cent hydrocyanic acid.	Same as P. I.	
Aqua Phenolata:				
Title.....	Phenoli solutio seu Aqua Phenolata.	Not official.	Aqua phenolata Phenoli solutio seu Aqua phenolata (P. I.).	Solutio Phenoli. (Formula Internationalis) Solutio acidi carbonici Ph. D. 1898. Phenoli solutio seu Aqua phenolata.
Requirement.....	Strength 2 per cent.....		1.94 to 1.99 per cent of absolute phenol.	Same as P. I.
Sodii Arsenas:				
Title.....	Arsenas sodii seu Sodii arsenas; Arsenicum natrium seu Natrium arsenicum.	Sodii Arsenas.....	Natrium arsenicum Arsenas sodii seu Sodii arsenas seu Arsenicum natrium (P. I.).	Not official.
Requirement.....	The crystallized salt containing 36.85 per cent of arsenic acid.	Anhydrous salt (equivalent to 1.67 parts of crystalline salt), chemical test.	36.83 arsenic acid, 24.02 per cent arsenic assay, chemical tests.	
Liquor Potassii Arsenitis:				
Title.....	Arsenicalis liquor Fowleri seu Liquor Arsenicalis Fowleri seu Kali Arsenicosi liquor.	Liquor Arsenicalis.....	Kalium arsenicosum solum Arsenicalis liquor Fowleri seu Liquor Arsenicalis Fowleri seu Kali Arsenicosi liquor (P. I.).	Liquor Arsenitis kalii. (Formula Internationalis.) Arsenicalis liquor Fowleri seu Liquor arsenicalis Fowleri seu Kali arsenicosi liquor.
Requirement.....	Strength in arsenious acid 1 per cent.	Strength in arsenious acid; color, taste, incompatibility.	Same as P. I.	1 per cent arsenious acid; appearance, odor, and chemical test.
Syrupus Ferri Iodidi:				
Title.....	Ferri iodidi sirupus seu Sirupus iodeti ferri seu Sirupus ferri iodati.	Syrupus Ferri Iodidi.....	Sirupus Ferri Iodati. Ferri iodidi sirupus seu Sirupus iodeti ferri seu Sirupus Ferri Iodati (P. I.).	Syrupus Iodeti ferri. (Formula Internationalis) Ferri iodidi sirupus seu Sirupus ferri Iodati.
Requirement.....	Strength in anhydrous ferrous iodide 3 per cent.	About 10 per cent of ferrous iodide.	Same as P. I.; color, chemical test, assay.	Same as P. I.; color and method of keeping.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1907, ETC.—Continued.

	Protocol, International.	B. P. C.	Ph. Helv. IV.	Ph. Dan. VII.
Tinctura Cantharidis:				
Title.....	Cantharidis tinctura seu Tinctura Cantharidis.	Tinctura Cantharidis	Tinctura Cantharidis..... Cantharidis tinctura seu Tinctura Cantharidis (P. I.).	Not official.
Strength.....	10 per cent.	1.25 gm. in 100 cc.	Same as P. I.	
Menstruum.....	Alcohol (70 per cent).	Alcohol (90 per cent).	Same as P. I.	
Requirement.....			Color, odor, taste, solubility.....	
Tinctura Iodi:				
Title.....	Iodi tinctura seu Tinctura Iodi.	Tinctura Iodi.	Tinctura Iodi. Jodi tinctura seu Tinctura Jodi (P. I.).	Solutio Jodi spirituosæ concentrata. (Formula Internationalis) Jodi tinctura seu Tinctura Jodi.
Strength.....	10 per cent.	2.5 gm. in 100 cc.	Same as P. I.	Same as P. I.
Menstruum.....	Alcohol (95 per cent).	Alcohol (90 per cent).	Same as P. I.	Same as P. I.
Requirement.....			Color, odor, behavior, assay. Should be freshly prepared.	Appearance, odor, and general behavior. Assay method.
Tinctura Lobellæ:				
Title.....	Lobellæ tinctura seu Tinctura Lobellæ.	Tinctura Lobellæ.	Tinctura Lobellæ. Lobellæ tinctura seu Tinctura Lobellæ (P. I.).	Tinctura Lobellæ. (Formula Internationalis).
Strength.....	10 per cent.	12.5 gm. in 100 cc.	Same as P. I.	Same as P. I.
Menstruum.....	Alcohol (70 per cent).	Alcohol (60 per cent).	Same as P. I.	Same as P. I.
Requirement.....			Color, taste, solubility, chemical test.....	Color, taste, and behavior with water.
Cocainæ Hydrochloridum:				
Title.....	Cocainum Hydrochloricum.	Cocainæ Hydrochloridum.	Cocainum hydrochloricum.....	Chloretum cocainum.
Requirement.....	The anhydrous salt.	The anhydrous salt.	Cocainum hydrochloricum (P. I.). Melting point 132° C., chemical tests.	Cocainum hydrochloricum. Same as P. I., chemical tests.
Unguentum Hydrargyri:				
Title.....	Hydrargyri unguentum seu Unguentum Hydrargyri.	Unguentum Hydrargyri.	Unguentum Hydrargyri cinereum..... Hydrargyri unguentum seu Unguentum Hydrargyri (P. I.).	Unguentum Hydrargyri.

COMPARATIVE TABLE SHOWING THE DEGREE OF COMPLIANCE IN THE SEVERAL PHARMACOPŒIAS PUBLISHED IN 1907, ETC.—Continued.

	Protocol, International.	B. P. C.	Ph. Helv. IV.	Ph. Dan. VII.
Strength.....	30 per cent.....	About 48 per cent of metallic mercury.	Same as P. I.....	Same as P. I.
Requirement.....		Unguentum Hydrargyri Dilutum contains 33 per cent of mercury ointment.	Color, assay.....	Color and extinction of mercury. ●
Vinum Antimonii: Title.....	Antimoniale vinum seu Vinum Antimoniale; Stibiatum vinum seu Vinum Stibiatum.	Vinum Antimoniale.....	Vinum Stibiatum..... Antimoniale vinum seu Vinum Antimoniale; Stibiatum vinum seu Vinum Stibiatum (P. I.)	Not Official.
Strength.....	In tartar emetic 0.40 per cent.....	0.457 w/v per cent tartar emetic.	Same as P. I.....	
Requirement.....			Chemical Test; color.....	

3. DROPS AND DROPPERS.

Thomann, J., points out that the Ph. Helv. IV includes a drop table, based on the international drop counter, giving the number of drops of various medicaments that are required to weigh one gm. and also giving the weight of the individual drops.—Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich, 1907, v. 25, p. 749.

A similar table is also included in the Ph. Dan. VII.

2. FOREIGN PHARMACOPŒIAS.

1. BRITISH PHARMACEUTICAL CODEX.

The British Pharmaceutical Codex, an imperial dispensatory for the use of medical practitioners and pharmacists.

By authority of the council of the Pharmaceutical Society of Great Britain. Published by the Pharmaceutical Society at 72 Great Russell street, London, W. C., 1907.

This book, held somewhat in the nature of a pharmacopœia, is virtually an elaborated British Pharmacopœia containing in addition to the text of the Ph. Brit. IV descriptions of a number of drugs and chemical substances not recognized by the pharmacopœia; also a very large number of formulas for galenical preparations that are in more or less widespread use in Great Britain.

The book contains a total XII and 1,425 pages, and comprises a total of 2,061 titles, including 49 animal drugs, 397 vegetable drugs, 442 chemical substances, 1,138 galenical preparations, and 35 general formulas or descriptive headings.

A book review of the B. P. C. asserts that the work is one of considerable magnitude. "The book is drawn up on pharmacopœial lines, and its scope, according to the preface, is that of an imperial dispensatory."—Pharm. J. Lond., 1907, v. 25, pp. 464-465.

Martin, N. H., criticises the new B. P. C. and suggests that a more suitable name for the book would have been "The Imperial Pharmaceutical Codex."—Chem. & Drug., Lond., 1907, v. 70, p. 690.

Robinson, R. A., jr., points out that in the matter of standards the codex does four things: (1) It confirms some of the standards of purity and "characters and tests" of the Ph. Brit.; (2) it contradicts some standards and tests of the Ph. Brit., alleging that they are impossible or valueless; (3) it offers certain alternative standards and tests for Ph. Brit. articles—notably for those used extensively for nonmedicinal purposes; (4) it suggests certain new standards and tests for medicaments at present unofficial.—Pharm. J. Lond., 1907, v. 25, p. 508.

Peck, E. Saville, points out that the B. P. C. is truly a monument of industry, and while there is much to be criticised about the book he believes that these shortcomings can readily be corrected in future revisions.—Brit. & Col. Drug., Lond., 1907, v. 52, pp. 440-441.

Gadd, H. Wippell, says that one misses from the codex a feature which would have been of considerable value, namely, new and revised tests and methods of valuation of drugs, for which there are at present no satisfactory official processes of assay. Thus, for example, whilst it is notorious that the official process for the estimation of nuxvomica preparations gives results varying with the taste and fancy of the experimenter, no alternative or modified method is given in the codex.—*Pharm. J. Lond.*, 1907, v. 25, p. 476.

Hill, C. A., criticises the B. P. C. from a manufacturing chemist's point of view and points out the discontinuity of the monographs, the unnecessary duplication of preparations, some of the objectionable features of the nomenclature adopted, and some of the errors that will result from the adoption of international atomic weights for the chemicals and Ph. Brit. atomic weights for the test solutions.—*Chem. & Drug.*, Lond., 1907, v. 71, p. 757.

Simpson, J. M., criticises the B. P. C., particularly the unnecessary multiplication of similar preparations, all having some little difference to pander to the vagaries of the prescriber.—*Ibid.*, v. 71, p. 846.

Gadd, H. Wippell, believes that the nomenclature of the B. P. C. is somewhat pedantic, the compilers having unearthed uncommon terms which might well have been left in obscurity. He also criticises a number of the newly coined names.—*Brit. & Col. Drug.*, Lond., 1907, v. 52, p. 389.

Dunhill, T. P., discusses the scope and the content of the B. P. C. and points out that the inclusion of a number of polypharmaceutical preparations would indicate that the book does not represent twentieth-century science but is a dictionary of pharmaceutical products, and as such fulfills a function.—*Australas. J. Pharm.*, Melbourne, 1907, v. 22, pp. 359–360.

A number of corrections and alterations suggested for the B. P. C., supplementary to those published in the book itself, are presented.—*Pharm. J.*, Lond., 1907, v. 25, p. 597.

Bevan, E. J., points out that some notion of the magnitude of the B. P. C. may be obtained by comparison of the index of some 100 pages, containing about 12,000 references, with the index of the Ph. Brit. IV, which contains between 3,000 and 4,000 references.—*Ibid.*, v. 25, p. 507.

Some additional comments on the B. P. C. are presented.—*Ibid.* v. 24, pp. 468–479, 488–491; v. 25, pp. 507–509, 602–604, 702–705.

2. SWISS.

Pharmacopœa Helvetica, editio quarta, German edition, was published in Berne, Switzerland, 1907, and contains XXXIV and 639 pages. 517 pages are devoted to monographs on drugs and prepa-

rations; 70 pages are devoted to tables of reagents, drops, maximum doses, table of the essential ingredients, and the percentage content of the several preparations, the presentation of a variety of analytical data, and finally, a comprehensive index of titles and synonyms covering 51 double-column pages.

The book contains a total of 853 titles, including 20 animal drugs, 224 vegetable drugs, 227 chemical substances, 353 galenical preparations, and 29 general formulas or descriptive headings.

The revision committee, directly responsible for the preparations of the Ph. Helv. IV, consisted essentially of the chairmen of nine sub-committees, including: 1, Crude drugs; 2, Inorganic preparations; 3, Organic preparations; 4, Galenical preparations; 5, Wines; 6, Serums and related substances; 7, Maximum doses, separanda; 8, Chemical and pharmaceutical tables; 9, Editorial committee. The general committee transacted the greater portion of its work by correspondence, though much of the work was transacted at the annual meetings of the committee, at which all of the final conclusions were discussed. The articles added to the Ph. Helv. IV amounted to 151, while those official in the Ph. Helv. III, not included in the present revision, numbered 96.

The fundamental principle guiding the admission of articles to the Ph. Helv. IV is defined as requiring that all articles used in the production of any preparation in the pharmacopœia, be described in a special monograph. Exceptions are made, however, in the case of aqua fontana, pastilli sacchari, and a number of other substances not considered of essential value or sufficiently active to be considered as medicinal ingredients.

The provisions of the International Conference for the Unification of Potent Medicaments have been closely followed, all of the remedies enumerated in the protocol being designated by the addition of the letters (P. I.).

A review of the Ph. Helv. IV calls attention to the definition for medicaments included in the Ph. Helv. IV, as follows: Medicines are substances used for the prevention or removal of abnormal conditions or processes in the human or animal organism or for the amelioration of disturbing, disagreeable, or dangerous phenomena.—Pharm. Ztg., Berl., 1907, v. 52, p. 871.

Thomann, J., reviews the Ph. Helv. IV, and points out that because of the numerous changes that it contains Swiss pharmacy is about to enter upon a new era. In concluding he asserts that while this pharmacopœia has its shortcomings the spirit that is evidenced and the scientific advances that are embodied serve to indicate that the book represents progress in pharmacognosy and will be liberally consulted in the revision of other national pharmacopœias.—Schweiz.

Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, pp. 625-628, 650-652, 669-671, 678-701, 714-720, 746-752.

Berger, F., criticises a number of requirements made by the Ph. Helv. IV, and points out a number of descriptions that fail to be uniform or show a lack of clearness.—*Ibid.*, v. 45, pp. 789-793.

Thomann, J., replies to the above.—*Ibid.*, v. 45, pp. 793-794.

An unsigned article reviews the Ph. Helv. IV, describes the book, enumerates some of the new additions, and points out some of the more characteristic features.—Pharm. Ztg., Berl., 1907, v. 52, pp. 870-871. (See also p. 893.)

Hanny, T., discusses the Ph. Helv. IV, and asserts that the book is a work bigger, handsomer, and in many ways more complete than either the Ph. Germ. or the Ph. Brit.—Chem. & Drug., Lond., 1907, v. 71, p. 617.

The Ph. Helv. IV is also reviewed at some length in Am. J. Pharm., Phila., 1907, v. 79, p. 573.

3. DANISH.

The Pharmacopœa Danica, 1907, published by royal decree, is printed in the vernacular, and is a comparatively small, 8 vo. book, containing a total of 522 pages. Six pages are devoted to the introduction and 402 to the monographs on drugs and preparations. An appendix of 52 pages is devoted to tables, and this is followed by rather a complete index of Latin names and a separate index of Danish names.

This pharmacopœia contains a total of 489 titles, including 14 animal drugs, 128 vegetable drugs, 144 chemical substances, 181 galenical preparations, and 22 general formulas or descriptive headings.

The weights and measures used are those of the metric system, and parts are designated as meaning parts by weight.

The degrees of temperature are those of the centigrade thermometer, and where not otherwise designated 15° C. is to be understood.

Maceration is to be conducted at 15-25° and digestion at from 35° to 45°.

Luke warm water is to be understood as having a temperature of from 35-45°, warm water is 60° or over.

A method for the determination of melting points is outlined; also a method for determining the solubility of substances.

The collecting and drying of plant drugs is also outlined, and the method of describing the various characteristics is indicated.

The preservation of drugs and chemicals is also outlined.

Ph. Dan. VII includes a table giving the number of drops of different official liquids necessary to weigh 1 gram, using the international drop counter.

An unsigned article reviews the Ph. Dan. VII. The former editions of this pharmacopœia were published in 1772, 1805, 1840, 1850, 1868, and 1893. The present 1907 edition is the first to be printed in the vernacular, though a Danish reprint of the 1893 pharmacopœia was published.—Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, pp. 477-479.

Moller, H. J., reviews the new Ph. Dan. VII and calls attention to some of the more important changes.—Arch. f. Pharm. og. Chem., Copenhagen, 1907, v. 14, pp. 257-265.

Wöhlk, Alfred, presents a review of the tests for chemicals embodied in the Ph. Dan. VII, describes and figures some of the apparatus that is necessary, gives a table enumerating the limit of ash in the several drugs, and discusses in detail the tests for the several official articles.—*Ibid.*, v. 14, pp. 277-281, 301-305, 321-327, 335-343, 350-356, 365-373, 381-387, 398-400, 447-451.

Gram, Bille, reviews the pharmacognosy of the Ph. Dan. VII.—*Ibid.*, v. 14, pp. 477-479.

Delphin, T., reviews the new Ph. Dan. VII and calls attention to the several changes that are embodied therein.—Svensk, farm. Tidskr., 1907, v. 11, pp. 343-348, 365-371.

Westling, R., discusses the drugs in the Ph. Dan. VII.—*Ibid.*, v. 11, pp. 381-385, 401-407.

An unsigned article reviews the Ph. Dan. VII and discusses the form of the Latin nomenclature.—Pharm. Ztg. Berl., 1907, v. 52, pp. 530-531.

Greenish, Henry G., reviews the new Ph. Dan. and calls attention to some of the more prominent characteristics, and concludes that on the whole this book will probably leave upon the mind of the British pharmacist the impression of not being quite up-to-date. This will be particularly noticeable in the qualitative and quantitative tests, and to a less extent in the galenical preparations. On the other hand, in the general arrangement and in the description of vegetable drugs it is well in the front rank.—Pharm. J. Lond., 1907, v. 25, p. 463.

Schimmel & Co. (Semi Ann. Rep., October, 1907, p. 102), point out that as compared with the old Ph. Dan., 1893, the new edition has no additional directions for testing volatile oils, so that generally only the color, odor, specific gravity, and solubility are taken into consideration. On the other hand, a great number of erroneous statements in the old pharmacopœia have been corrected, and the requirements specified by the new edition may be characterized almost without exception as being to the point.

4. AUSTRIAN.

Wulff, C., reviews the Ph. Austr. VIII at some length, and calls attention to a number of interesting features embodied in this

pharmacopœia.—Apoth. Ztg., Berl., 1907, v. 22, pp. 877-879, 888-890, 897-898, 905-906, 928-929, 940-942, 949, 961-962, 969-971, 978-982, 1009-1010, 1019-1022, 1032-1033.

5. BELGIAN.

Schamelhout, A., reviews the articles contained in the Ph. Belg. III.—Bull. Soc. roy. de pharm., Brux., 1907, v. 51, pp. 10-21, 33-41, 65-78, 97-106, 129-144, 160-170, 193-208, 225-241, 257-266, 289-304, 321-334, 353-367.

Flurey reviews the Ph. Belg. III, and calls attention to some of the characteristic features announced in the preface.—Apoth. Ztg., Berl., 1907, v. 22, pp. 107-109, 118, 125-127, 135-136, 145-146, 153, 161-162.

Bougault, J., criticises the arrangement of the Ph. Belg. III; he thinks the grouping by pharmaceutical forms more practical and more generally adopted in other pharmacopœias. While the plan of giving the process of preparation of medicaments of the same group, in one article under the name of the pharmaceutical form avoids repetition, this conciseness may be carried to an extreme, because there are frequently special details with reference to certain medicaments which should be taken into consideration to secure uniformity. In the descriptions of the assays, perspicuity is sacrificed to brevity, the object in view should be indicated, also the proportion of the principle upon which the activity of the medicament depends. He credits Belgium with the honor of organizing the Brussels conference, but regrets that the international formulas are not indicated in the text. He notes the list of apparatus which the pharmacist is required to have, and wonders that there is no corresponding list of reagents. The directions as to dosage he commends for adoption in the forthcoming edition of the Codex.—J. de pharm. et de chim., Par., 1907, v. 25, pp. 244-250.

Vecray, F. L., (Gaz. Med. Belg.) points out some of the peculiarities of the new edition of the Ph. Belg.—Pharm. Era., N. Y., 1907, v. 37, p. 107.

6. JAPANESE.

An unsigned article reviews the English translation of the Ph. Japon. III, points out some of the new additions and calls attention to the general adherence to widely established standards and the similarity in arrangement and content with the Ph. Germ., thus evidencing an appreciation of the possibilities of international standards.—Pharm. Ztg. Berl., 1907, v. 52, p. 962.

An editorial discusses an epitomised review of the Ph. Japon. III and points out that so far as one is able to judge the allegation by some Japanese pharmacists that the new edition is merely a trans-

lation of the German "Arzneibuch" is not justified. Naturally, it approximates to occidental pharmacopœias, but it is not a slavish copy of any.—*Chem. & Drug.*, Lond., 1907, v. 71, pp. 648–649.

Howards & Sons point out that the general lines followed by this pharmacopœia are those of the Ph. Germ. IV, but the severity of the standards of various articles differs considerably, often being too lenient and often too severe for ordinary commercial requirements.—*Ibid.*, v. 71, p. 693.

An unsigned article reproduces a notice issued by the Government of Japan to the effect that the enforcement of the provisions of the new Ph. Japon. have been deferred to January 1, 1908.—*Ibid.*, v. 71, p. 133.

Van Schoor, O., reviews the Ph. Japon. III (German translation), calls attention to some of the more characteristic features, and concludes that it is a thoroughly modern book, devoid of antiquated or useless medicaments, containing practically all of the really useful articles in the "arsenal" of medicine.—*J. de pharm. d'Anvers*, 1907, v. 63, pp. 917–925.

An unsigned article calls attention to the German translation of the Ph. Japon. III, published in Osaka.—*Pharm. Weekbl.*, 1907, v. 44, p. 1368.

Weigel, G., presents a review of the new Ph. Japon., its style, contents, and general arrangement; also discusses the drugs, chemicals, and galenical preparations that have been included.—*Pharm. Zentralh.*, 1907, v. 48, pp. 909–914.

An unsigned article discusses some of the features of the Ph. Japon. III and reproduces a list of errata in the English translation.—*Chem. & Drug.* Lond., 1907, v. 71, pp. 692–693.

The English translation of the Ph. Japon. III contains the following:

NOTICE.

Neither the Pharmaceutical Society of Japan nor the translator is responsible for any loss, damage, or controversy which may arise either from misinterpretation of the original Japanese Pharmacopœia or from any errors which may occur in the printing. All corrections and suggestions will be thankfully received.

7. BRITISH.

"Gnomon" asserts that the national medicine book has never been a source of general information for pharmacists, because medical men do not appreciate the needs of pharmacists, so far as works of reference are concerned.—*Pharm. J. Lond.*, 1907, v. 24, p. 170.

Hornblower, J. T., is reported as discussing the Ph. Brit. as a book of reference; he emphasized its defects as a source of general informa-

tion for pharmacists, and suggested that the medical council extend the information contained in the pharmacopœia so as to make it more valuable as a book of reference.—*Ibid.*, v. 24, p. 143.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, pp. 107–108) point out that the British Pharmacopœia Commission has issued proposals for altering the tests of a large number of official preparations.

An editorial points out that the committee of reference in pharmacy has reported to the pharmacopœia committee of the General Medical Council on the changes that will be necessary in the next issue of the Ph. Brit. in order to give effect to the international agreement for the unification of pharmacopœial formulas for potent preparations. The committee of reference shows that effect can be given with comparative ease to some of the changes suggested in the agreement. It is pointed out, however, that a few of the proposals are both retrograde and dangerous, while others will involve much inconvenience or will actually be impracticable.—Pharm. J. Lond., 1907, v. 24, p. 487.

The Ph. Brit. committee of reference in pharmacy presents a list of articles now included in the pharmacopœia and requests the cooperation of British chemists in the compilation of statistics on the use of official substances.—Chem. & Drug. Lond., 1907, v. 71, p. 115.

The report of the committee on pharmacopœia is reprinted.—Canad. Druggist, Toronto, 1907, v. 19, pp. 43–51, 100–107.

Commenting on the suggestions made by the committee appointed by the American Medical Association to make suggestions for the improvement of the U. S. P., the editor says: "These observations might be applied to the Ph. Brit. in so far as concerns the production of a work that might become the guide, philosopher, and friend of the physician."—Pharm. J. Lond., 1907, v. 25, p. 197.

8. GERMAN.

Frerichs, G., offers a number of suggestions for the revision of the Ph. Germ.—Apoth. Ztg. Berl., 1907, v. 22, pp. 12–13, 192–194, 203–205, 228–229, 238.

Weichert, W., discusses the Ph. Germ. expressed or accepted definitions for the several pharmaceutical preparations, suggests a number of additional classes and criticises some of the present groups.—Apoth. Ztg., Berl., 1907, v. 22, pp. 638–641, 650–652, 666–668.

The editor presents, without additional comment, a compilation of suggestions, for the coming Ph. Germ. V that have been furnished by apothecaries, physicians, and veterinarians in answer to the request by the president of the Imperial Health Office, which department is intrusted with the compilation, revision, and publication of the Ph. Germ.—*Ibid.*, v. 22, pp. 1037–1040, 1051–1054, 1062–1065.

Frerichs, G., calls attention to the difference between the Ph. Germ. descriptions of vegetable drugs and of chemicals and points out that

the present pharmacopœia requires that the apothecary have a much greater proficiency in botany than in chemistry. He also suggests that the chemistry of the Ph. Germ. be couched in more technical language. Referring to alkaloidal determinations he points out that the Ph. Germ. IV in its assay methods for drugs and their preparations, does not include a statement as to the resulting percentage of alkaloid and suggests that this be corrected.—*Ibid.*, v. 22, pp. 12-13.

9. FRENCH.

According to the strict letter of French law, all those substances which are not included in the Codex, or the formulæ of which have not been approved by the Academy of Medicine, are classed and treated as "remèdes secrets." The commission of publication of the new Codex have very properly omitted certain drugs and preparations which have become more or less obsolete, and the question has arisen, What are these drugs now? They will not be in the Codex, so are they "remèdes secrets?" This question has been submitted to a medico-legal commission for an expression of opinion. This commission reported that the Codex was not so much a license for the sale of certain articles by pharmacists, but that it represented the minimum of such drugs as are required by law to be supplied at need. The successive editions of the work must be taken as a whole; an article once included in one edition did not cease to be an accepted official remedy merely because it might happen to be deleted from any subsequent edition. In fact, the law expressly states that it is obligatory on pharmacists to prepare and stock preparations which have been published and which may be published in future, thus making the act both retrospective and prospective.—*Pharm. J. Lond.*, 1907, v. 24, p. 761.

10. DUTCH.

The chemical articles included in the Ph. Ndl. are reviewed and criticised at some length in a serial article by one of the editors.—*Pharm. Weekbl.*, 1907, v. 44, p. 18, ff.

Schoorl, N., discusses the arsenic test now official in the Ph. Ndl. IV.—*Ibid.*, v. 44, pp. 57-67.

The same discusses the tests for purity.—*Ibid.*, v. 44, pp. 121-137.

Suijver, J. F., discusses the examination of fixed oils and of mineral oil.—*Ibid.*, v. 44, pp. 341-343.

Wester, D. H., presents some observations on the medicaments included in the Ph. Ndl. IV.—*Ibid.*, v. 44, pp. 710-715.

Schoepp reviews the Ph. Ndl. IV at some length and calls attention to many of the details in which this pharmacopœia excels.—*Apoth. Ztg. Berl.*, 1907, v. 22, pp. 21-22, 33-35, 45, 54-55.

11. SPANISH.

Vosz, Arnold, reviews the Ph. Hisp. VII, and points out that compared with the Ph. Hisp. VI this is a thoroughly modern book.—Apoth. Ztg. Berl., 1907, v. 22, pp. 79–80, 90–92.

12. ITALIAN.

An abstract points out that the Ph. Ital. is at present undergoing revision, and that the list of articles which must be in stock in Italian pharmacies will be increased by over 100 additions. It is also pointed out that the tests will be increased in number and brought up to date, and that the polariscope will probably be added for the examination of essential oils. The majority of the committee are against the introduction of fluid extracts into the pharmacopœia. A number of other changes are also discussed.—Chem. & Drug., Lond., 1907, v. 70, p. 911.

3. COMMENTS ON U. S. P. VIII RELATIVE TO THE REQUIREMENTS OF THE BRUSSELS CONFERENCE.

Whelpley, H. M., in discussing the changes that were embodied in the U. S. P. VIII, points out that the change in the strength of potent tinctures was not the result of a whim on the part of the committee on revision. It was an effort to meet the regulations adopted by an international congress, held at Brussels in 1902, which met to consider the adoption of a uniform standard of strength for those potent medicines which are used in practically all civilized countries. Our Pharmacopœia is the first one to be revised since that convention, and the first one to adopt the standards which, no doubt, will be followed by other pharmacopœias when their works are revised. This will enable a person to obtain uniform tincture of aconite, no matter whether the prescription is compounded in St. Louis, London, Paris, Berlin, or any other country represented at the Brussels Conference.—Proc. Arkansas Pharm. Ass., 1907, p. 65.

Greenish, Henry G., points out that the conspicuous failure on the part of the United States to bring its formulas into harmony with those of the agreement, as shown by a comparative review that he has made, is the more remarkable when considered in conjunction with the statement in the preface that “the recommendations of this (the international) conference have been adopted by the committee of revision, except in one or two instances.” He presents the following table showing approximately the extent to which compliance with the requirements of the international agreement obtains in the pharmacopœias examined.

	Complete agreement.	Approximate agreement.	Want of agreement.
	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
Spanish.....	90.50	.....	3.50
Belgian.....	87.50	6.25	6.25
Dutch.....	81.25	6.25	12.50
Austrian.....	77.00	11.00	11.00
United States.....	26.66	30.00	43.33

That such compliance has not been attained without, in some cases, very considerable alteration, is indicated by the fact that the Ph. Belg. has been compelled to modify 80 per cent of its formulas, the Ph. Hisp. 75 per cent, and the Ph. Ndl. 39 per cent; on the other hand, the Ph. Austr. and U. S. P. have altered only about 6 per cent.—Pharm. J., Lond., 1907, v. 24, p. 833.

An editorial outlines the history of the U. S. P. from its origin, in 1817, to the present time, also includes list of changes and corrections in the U. S. P. VIII.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 90.

Thrush, M. Clayton, reviews the history of the U. S. P. and the history of the several decennial conventions.—Drug. Circ., N. Y., 1907, v. 51, pp. 43–52.

SPANISH EDITION OF THE U. S. P. VIII.

Díaz, Guillermo, points out some of the reasons why he and other Cuban pharmacists were desirous of having the U. S. P. translated into Spanish.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 7–8.

An editorial points out that the U. S. P. in its Spanish translation will undoubtedly do much to further the progress of American ideas in the countries to the south of us, and trade in American pharmaceuticals is sure to benefit by the development of improved relations.—Am. Druggist, N. Y., 1907, v. 51, p. 132.

Remington, Joseph P., reports that 250 typewritten pages of the Spanish translation of the Pharmacopœia had been prepared, and that the work is being actively continued.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 37.

III. COMMENTS ON OFFICIAL ARTICLES.

ACACIA.

Nelson, Burt E., discusses the nature and origin of acacia and describes the appearance of its powder under the microscope.—Merck's Report, N. Y., 1907, v. 16, p. 192.

An abstract points out that gum arabic, which forms one of the more important minor exports of Egypt, is really the sap from a special kind of tree, whole forests of which are found in the Kordofan Province, and also near Dedid, in the White Nile Province. The confectionery trade is perhaps the principal purchaser of gum arabic, though a very large number of other industries, e. g., chemical works, printing and dyeing mills, letterpress printers, and so on, are interested in this product of the Sudan.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, July 1, p. 52.

An abstract (from *Moniteur Officiel du Commerce*) reviews the trade of Egypt with acacia in the year 1906 as compared with 1905, giving the chief countries to which the drug was exported, the quantity, and value.—Chem. Ind., Berl., 1907, v. 30, p. 319.

An unsigned abstract from the report of the Wellcome Research Laboratories at the Gordon Memorial College, Khartoum, describes Sudan "gum arabic," the source of the gum, and the determination of viscosity of gum solutions.—Merck's Report, N. Y., 1907, v. 16, pp. 43-45, 69-70.

Boucher, V., presents a comprehensive study on the chemical constitution of gums.—Bull. de Pharm. du Sud-Est., 1907, v. 12, pp. 73-84, 191-233.

Vamvakas, Jean, says that Nessler's reagent gives in the cold with a solution of gum arabic concentrated to 30 per cent, and after agitation, a turbid emulsion of a dirty gray color, and forms, after a time, a gray precipitate at the bottom of the vessel. Operating at a boiling temperature, the gray precipitate is formed immediately; but the precipitate is produced only in very minute quantity if tartaric acid be added to the solution of gum before adding the Nessler reagent and bringing it to the boiling point.—Ann. de chim. analyt., Par., 1907, v. 12, p. 13.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 77) reports on three samples of acacia, which were found to contain 2.84, 2.43, and 4.18

per cent of ash. He points out that the Ph. Austr. VIII limitation of 3 per cent of ash is low and that the Ph. Germ. IV of 5 per cent is somewhat high.

Reyer, Emil, discusses mucilage of acacia, its various shortcomings, and the attempts that have been made to correct them. He asserts that in his experiments lime water has not proved to be a satisfactory preservative.—Merck's Report, N. Y., 1907, v. 16, p. 164.

Mittelbach, Wm., asserts that the use of lime water in making the mucilage of acacia is not new. This has been suggested by practical men years ago, and the committee on revision did right in adopting it.—Proc. Missouri Pharm. Ass., 1907, p. 131.

Hommell, P. E., points out that while mucilage of acacia made with lime water does not show as much mold as the old formula, there is disagreeable lime water odor and some precipitation. He thinks the addition of lime water has not proved to be entirely satisfactory as a preservative.—Proc. New Jersey Pharm. Ass., 1907, p. 62.

Thomann, J., points out that the Ph. Helv. IV provides that mucilage of acacia be heated for half an hour on a water bath to destroy the oxydases present. This heating changes the properties of the mucilage somewhat, but does not impair its usefulness.—Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 748.

Pinchbeck, G., calls attention to the possibilities of preserving mucilage of acacia by sterilization. He adds that addition of antiseptics such as chloroform or benzoic acid are to be deprecated when a simple method of preservation such as the one he recommends is available.—Pharm. J. Lond., 1907, v. 25, p. 304.

Alcock, F. H., in discussing the preservation of mucilage of acacia asserts that there is something present in myrrh which acts as a wonderful antiseptic and preservative. He has found that mucilage made with residual myrrh from the tincture keeps better than official mucilage.—*Ibid.*, v. 25, p. 279.

Brown, J. F., recommends the use of benzoic acid for the preservation of mucilage of acacia. He adds 4 grains to the amount of gum prescribed by the Ph. Brit. and asserts that the resulting mucilage keeps perfectly without moulding or souring.—*Ibid.*, v. 25, p. 234.

A book review of the B. P. C. points out that formaldehyde is recommended as a preservative for mucilage of acacia.

The experience of some workers with formaldehyde as a preservative of vegetable preparations has been far from satisfactory. Assuming that the statement is quite correct it is probably the best substance that could be employed for the purpose, as there are objections to such substances as cinnamon water and benzoic acid, both of which have recently been advocated.—*Ibid.*, v. 25, p. 465.

Manseau, M., discusses the use of acacia as a pill excipient and controverts the claims made by M. Carles that acacia tends to make pills hard, insoluble, and inert, and tends to decompose readily changed constituents.—Bull. Soc. de pharm. de Bordeaux, 1907, v. 47, pp. 236–238.

Beringer, George M., calls attention to the continuance of the Ph. Germ. title, *Pluvis gummosus* as a synonym for compound powder of acacia N. F. despite the dissimilarity of the two preparations.—Am. J. Pharm., Phila., 1907, v. 79, p. 364.

ACETANILIDUM.

Schlotterbeck, J. O., outlines the production of acetanilide and its method of purification.—Bull. Pharm., 1907, v. 21, p. 331.

Schweitzer, Hugo, outlines the history of the introduction of acetanilide as a therapeutic agent and asserts that the accidental discovery of the therapeutic properties of acetanilide leads to the introduction of a number of related compounds, such as phenacetin, lactophenin, phenocoll, and aspirin.—D.-A. Apoth.-Ztg., N. Y., 1907, v. 28, p. 25.

Seidell, Atherton, contributes a paper on the solubility of acetanilide. In a second paper he describes a rapid method for the quantitative determination of acetanilide in headache powders.—J. Am. Chem. Soc. 1907, v. 29, pp. 1088–1091, 1091–1095.

Turner and Vanderkleed discuss the estimation of acetanilide and phenacetin in complicated mixtures. For the former they recommend saponification of the acetanilide by means of an alkali; distillation of acetic acid from the resulting acetate, from an acid distillate and the titration of the distillate.—Am. J. Pharm., Phila., 1907, v. 79, pp. 151–156.

Lücker, Edward, believes that in view of the reliability of the indophenol reaction for identity of acetanilide the isonitril reaction may well be omitted from future editions of the Ph. Germ.—Apoth. Ztg. Berl., 1907, v. 22, p. 1045.

Blome, Walter H. (Com. on Adulterations) reports 40 samples examined; all satisfactory; one gave a yellow color when dissolved in sulphuric acid.—Proc. Michigan Pharm. Ass., 1907, p. 66.

Smith, Otis W., points out that the revision committee has been criticised in some quarters for including compound acetanilide powder, but so long as the public insists on consuming headache powders in such enormous quantities pharmacists may as well have an official formula for preparing the product. He concludes that the formula would have been improved by the addition of monobromated camphor.—Proc. Missouri Pharm. Ass., 1907, p. 136.

An editorial asserts that 200 tons of acetanilide are said to go into consumption in this country annually.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 292.

Wilbert, M. I., calls attention to the fact that mixtures containing acetanilide which, formerly were exploited as being definite chemical compounds, are now being marketed as mixtures. *Antikamnia*, formerly an acetanilide mixture, is being marketed as a mixture containing 350 grains of acetphenetidin in each ounce. *Ammonol* is said to be ammonium phenyl acetamid on one portion of its label and directly underneath is said to contain 240 grains of paracetylphenetidin in each ounce. *Phenalgin*, marketed as an ammoniated phenylacetamid, is labelled as containing 50 per cent of acetanilidum.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 131.

An unsigned article discusses the utility of acetanilide and the reported fatalities from the use of this drug.—*New Idea, Detroit*, 1907, v. 29, pp. 345-346.

The editor of the "Therapeutics" column gives a résumé of the actions of the various substances used in headache powders, including acetanilide, phenacetin, caffeine, and sodium bicarbonate and ammonium carbonate, with a plea for common sense in their use.—*J. Am. M. Ass.*, 1907, v. 49, p. 1689.

Kirk, C. D. R., after many trials uses 4-grain tablets composed of acetanilide 7 parts, soda bicarb., 2 parts, tartaric acid one-half part, with one-sixtieth grain of strychnine nitrate to each tablet. He orders these antifever tablets by the 10,000 and generally uses that amount throughout the year. He gives the tablets in all fevers, and regardless of fever when there are remissions or intermissions; one every two hours when there is fever, and every three hours when clear of fever. He thinks that in the doses usually prescribed, regardless of the strength of the heart's action, by the "regulars," acetanilide will make angels very often.—*Eclectic M. J., Cincin.*, 1907, v. 67, p. 34.

Additional references on the use and the toxicology of acetanilide will be found in the *Index Medicus* and the *J. Am. M. Ass.*

ACETONUM.

White, Edmund, discusses acetone, its physical properties, tests, and the trade varieties.—*Pharm. J., Lond.*, 1907, v. 24, p. 404.

Sy, Albert P., for the rapid estimation of acetone, has adapted the well-known method of Messinger, so that the burette readings give the number of grammes of acetone in 100 cc. (sometimes expressed as per cent) directly.—*J. Am. Chem. Soc.*, 1907, v. 29, p. 786.

Denigés, M. G., discusses the difficulty of determining acetone in the presence of thymol.—*Bull. Soc. de pharm. de Bordeaux*, 1907, v. 47, p. 195.

Porcher and Hervieux consider the reaction of Penzoldt, which they describe as the most characteristic.—*Répert. de pharm. Par.*, 1907, v. 19, p. 304.

Bacon and Freer discuss the action of sodium on acetone, report some experimental work, and conclude that the original description of sodium acetone, stating that the compound contained has 30.17 per cent of sodium, was correct.—*Philippine J. Sc.*, 1907, v. 2, A., pp. 67–68.

Coblentz, Virgil, discusses the detection of denaturized spirits in galenicals and outlines the following (Legal's) test, which is based on the presence of acetone in denatured alcohol: To about 5 cc. of the spirit add 1 cc. of a solution of sodium nitroprusside (1 to 100) made alkaline by the addition of a solution of sodium hydroxide; a yellowish red color is produced, which, after cautiously acidifying with acetic acid, changes to a violet. If acetone is absent a lemon-yellow color is produced through the addition of the nitroprusside solution, which, through acidulation with acetic acid, is completely decolorized.—*Merck's Report*, N. Y., 1907, v. 16, p. 68.

Babington, Fred W., discusses the detection of wood spirits in acetone; he determines the methyl alcohol by converting it into a volatile ester and titrating.—*J. Soc. Chem. Ind.*, 1907, v. 26, pp. 243–244.

Blome, Walter H. (Com. on Adulterations) reports 6 samples examined; 5 satisfactory, one had an alkaline reaction.—*Proc. Michigan Pharm. Ass.*, 1907, p. 66.

Patch, E. L., reports a sample of acetone acid in reaction. Not U. S. P.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

ACETPHENETIDINUM.

Schlotterbeck, J. O., outlines the manufacture of phenacetin and describes the several steps that are required in the building up of this product.—*Bull. Pharm.*, 1907, v. 21, p. 331.

The Ph. Dan. VII gives phenacetinum as the official title for acetphenetidinum.

Good, J. M., asserts that the reason that the agency for the Bayer products quotes phenacetin at \$4 a pound and the same substance exactly under the name acetphenetidin at \$1.15 a pound is because they are loath to loosen their grip upon a monopoly. They still claim proprietorship in the name. There is good reason to believe that the ownership in the name expired with the patent, but the Committee of Revision did not care to contest the matter legally.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 63.

Turner and Vanderkleed outline a method for the determination of acetanilide and phenacetin in pharmaceutical mixtures.—*Am. J. Pharm.*, Phila., 1907, v. 79, pp. 151–156.

Repiton calls attention to the fact that both phenacetin and salophen contain the acetic nucleus, while aspirin is an acetic ether of salicylic acid. Heated on a porcelain capsule over a Bunsen burner these compounds may therefore be recognized by the odor of this acid given off. Phenacetin dissolves in water in the proportion of 1 to 1,500; aspirin, 1 to 100; while salophen has an odor characteristic of essence of geranium, an odor of salol.—*Ann. de chim. analyt. Par.*, 1907, v. 12, p. 268.

Seidell, Atherton, contributes a paper on the solubility of acetphenetidin.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 1088–1091.

Blome, Walter H. (Com. on Adulterations), reports that only one sample out of many showed the slightest trace of the presence of acetanilide.—*Proc. Michigan Pharm. Ass.*, 1907, p. 66.

Dohme and Englehardt report examining one lot of acetphenetidin considerably adulterated with acetanilide.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 378.

Graham, Willard, examined a large number of samples, only one being of inferior quality.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 236.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 13) reports on three samples of acetphenetidin, one of which produced a brown color with concentrated sulphuric acid, and left a perceptible residue on incineration.

Kebler, Lyman F., points out that the deleterious effects of acetphenetidin and antipyrine have not been given proper publicity, and that the public has little knowledge of the meaning of the words acetphenetidin and antipyrine.—*J. Frankl. Inst. Phila.*, 1907, v. 163, p. 309.

Rodgers, C. W., thinks that when prescribed it would be safer to indicate in parentheses the name of Bayer, because that is the name of the concern that has been manufacturing this preparation for so long a time that they must understand its manufacture better than the casual druggist.—*Dental Cosmos, Phila.*, 1907, v. 49, p. 847.

ACIDUM ACETICUM.

White, Edmund, gives the properties of and tests for pure acetic acid; also discusses the trade varieties of the acetic acid, and asserts that when an acid short of glacial strength is required the 80 per cent acid is convenient, as it is not liable to solidify in cold weather.—*Pharm. J. Lond.*, 1907, v. 24, p. 404.

Eberlein, L. (*Pure Products*, 3, 1907, No. 4, pp. 173–177), describes the manner in which pure cultures of acetic acid bacteria are used in vinegar making.—*Exp. Sta. Rec.*, 1906–7, v. 18, p. 1079.

Blome, Walter H. (Com. on Adulterations), examined 10 samples of dilute acetic acid varying from 2.76 to 6.73 per cent of absolute acetic acid. He suggests that dealers declare the strength of this acid on the label.—*Proc. Michigan Pharm. Ass.*, 1907, p. 66.

Caspari, Chas. E. (Com. on Adulterations), examined 32 samples—30 satisfactory, 2 weak in strength.—*Proc. Missouri Pharm. Ass.*, 1907, p. 142.

Gilmour, J. P., reports 6 out of 30 samples as not complying with Ph. Brit. requirements, average deficiency 3.12 per cent; the non-conforming samples said to be German.—*Year Book of Pharmacy*, London, 1907, pp. 446-455.

ACIDUM ACETICUM GLACIALE.

The inspectors of pharmacies found samples of glacial acetic acid containing as low as 60 per cent of acetic acid, and point out the need for controlling this preparation.—*Ann. de pharm. Louvain*, 1907, v. 13, p. 324.

van der Harst, J. C., found a sample of (glacial) acetic acid containing 93.7 per cent of absolute acid and not complying with the permanganate test.—*Pharm. Weekbl.*, 1907, v. 44, p. 1506.

Gilmour, J. P., reports 2 out of 10 samples not up to Ph. Brit. requirements; average deficiency 6.45 per cent.—*Year Book of Pharmacy*, Lond., 1907, pp. 446-455.

ACIDUM BENZOICUM.

Kwisda reviews several recent papers on the differentiation of the various kinds of benzoic acid, and points out that at the present time the presence of chlorine compounds is sufficient to differentiate between synthetic and the natural acid, though should it be possible to produce an absolute chlorine free synthetic benzoic acid some other method of differentiation must necessarily be developed.—*Ztschr. d. allg. österr. Apoth. Ver.*, Wien, 1907, v. 45, p. 339.

Dohme and Englehardt assert that the amount of substance taken for the chlorine test is too small, it should be increased to 1 gm. The manufacturers of synthetic benzoic acid are in a position to reduce the amount of chlorinated products to a minimum and with 0.5 gms. of substance taken, an adulteration of true benzoic acid can hardly be detected.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 378.

Cormimboeuf and Grosman discuss the differentiation of the diverse pharmaceutic benzoic acids.—*Répert. de pharm. Par.*, 1907, v. 19, pp. 9, 57, 151-153.

See also Ruff, E., (*J. de pharm. d'Anvers*, 15, II, 07, from *Pharm. Zentralh.*) who uses the Beilstein reaction with copper oxide.—*Ibid.*, v. 19, p. 177.

Lehmann, K. B., (*Chem.-Ztg.*, 32, 949-952, Sept. 30) reviews the literature relating to the use of benzoic acid for the preservation of foods, and lays down several fundamental principles regarding this subject.—*Chem. Abstr. Am. Chem. Soc.*, 1908, v. 2, No. 24, p. 3373.

Scoville, Wilbur L., discusses the possibility of mistaking cinnamic for benzoic acid in food analysis and points out that cinnamic acid produced by oxidation of oil of cassia, used as a condiment, may readily be mistaken for added benzoic acid.—*Am. J. Pharm., Phila.*, 1907, v. 79, pp. 547-551.

Scheringa, K., discusses the separation of benzoic and cinnamic acids, and outlines a method which depends on the lesser solubility of salts of cinnamic acid, particularly calcium salts, and the comparative stability of cinnamic acid, in the presence of potassium permanganate in the cold.—*Pharm. Weekbl.*, 1907, v. 44, pp. 984-986.

Bigelow and Howard (*The Caterer*) outline a method for the detection of benzoic acid used as a preservative. The sample is to be extracted with chloroform. The chloroform is then evaporated on a water bath and the resulting benzoic acid crystals can readily be recognized by the unmistakable odor.—*Mdl. Drug. Columbus*, 1906-7, v. 8, p. 493.

Béguin, Ed., presents an abstract (from *Répertoire de pharmacie*, Jan. 1907, p. 9), which outlines a test for differentiating between the several forms of benzoic acid used in pharmacy.—*Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich*, 1907, v. 45, p. 112.

Goldschmiedt, Guido, reports a study of a product occurring in the technical production of benzoic acid from coal tar. This product he has determined as 4-oxyisophtalic acid.—*Monatsh. f. Chemie, Wien*, 1907, v. 28, pp. 1091-1097.

Troxell, H. L., (*Com. on Adulterations*), reports true benzoic acid as being sometimes adulterated with synthetic benzoic acid, which, however, can easily be detected by the test for chlorinated products.—*Proc. Maryland Pharm. Ass.*, 1907, p. 85.

Patch, E. L., examined 5 lots; 1 contained a notable amount of a chlorine compound.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

ACIDUM BORICUM.

Frank, A., describes the production of boric acid in Tuscany.—*Ztschr. f. ang. Chem.*, 1907, v. 20, pp. 258-262.

An abstract outlines the history of boric acid and describes its occurrence in Tuscany.—*Nat. Druggist, St. Louis*, 1907, v. 37, p. 388.

Winkler, John, discusses some factors in boric acid manufacture.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 1366-1371.

Gehe & Co. (*Handels-Bericht*, 1907, p. 51) discuss the production of boric acid and borax and give the amount of crude and purified products imported into Germany during the years 1904 to 1906.

Kline and Graham point out that commercial boric acid is of U. S. P. strength and purity for all practical purposes, but that it is liable to contain a very diminutive amount of such impurities as iron and aluminum, chlorides and sulphates.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 83.

Barthe, M. L., discusses the iodometric determination of boric acid.—*Bull. de la Soc. de Pharm. de Bordeaux.*, 1907, v. 47, pp. 33–36.

Frerichs, G., suggests that curcumin paper gives a much more satisfactory reaction with boric acid than curcuma paper.—*Apoth. Ztg. Berl.*, 1907, v. 22, p. 193.

Bigelow and Howard (The Caterer) outline a method for the detection of boric acid and sodium borate. The sample is treated with water and the boric acid liberated by means of hydrochloric acid. The resulting solution is then tested with turmeric paper.—*Mdl. Drug.*, Columbus, 1906–7, v. 8, p. 493.

Manning and Lang discuss the estimation of boric acid and borates in food stuffs and commercial articles.—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, pp. 803–804.

Alcock, F. H., outlines a method for the detection of boric acid in milk.—*Chem. & Drug. Lond.*, 1907, v. 70, p. 136.

Dohme and Englehardt report a large lot of boric acid containing more than the allowed amount of calcium and iron, and call attention to the fact that when boric acid is moistened and mixed with a certain green aniline color it bleaches the coloring matter on drying, but on wetting again the green color appears. They are unable to identify the substance producing this effect.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 378–379.

Troxell, H. L., (Com. on Adulterations) found two lots of boric acid to contain more than the allowed amount of calcium and iron in addition to sulphates.—*Proc. Maryland Pharm. Ass.*, 1907, p. 85.

Blome, Walter H., (Com. on Adulterations) reports on 13 samples of boric acid; solubility in water and alcohol varies; one contained traces of sulphate and chloride and another of sulphate only.—*Proc. Michigan Pharm. Ass.*, 1907, p. 67.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, pp. 11–12) found the usual impurities in the commercial varieties to be lead, copper, arsenium, iron, and sulphates. They detected as much as 1 grain of lead per pound in one sample, others containing one-half grain and under. Several samples showed, in their hands, the presence of 5 and 7 parts of arsenium per million, and they are informed that much worse is on the market. They state that the Ph. Japon makes a move in the right direction in defining to some extent, limits for the less harmful impurities in articles of this kind.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 16) reports examining 18 samples of boric acid, of which only 6 complied with the requirements of the pharmacopœia. The remaining preparations contained chlorine compounds, sulphuric acid, and one sample even contained nitric acid and heavy metals.

The editor of the "Medico-Legal" column quotes the *Western Morning News* to the effect that a coroner's jury had decided that a woman whose death they were considering had died as the result of boric acid, taken as an abortifacient.—*Brit. M. J.*, 1907, v. 2, p. 1695.

A communication from Pacific Coast Borax Company denies that boric acid has any harmful effects, and asserts that if we are to condemn substances because they are deleterious to the human system in excessively large doses everything in existence would have to be condemned.—*Pharm. Era.*, N. Y., 1907, v. 37, pp. 513-514.

Allan, J., (*Brit. J. of Children's Dis.*, Lond., Oct.) states that some persons are extremely susceptible to the action of boric acid, and in such persons it produces gastrointestinal disturbances, diarrhea, and vomiting, and sometimes a rash.—*J. Am. M. Ass.*, 1907, v. 49, p. 1958.

Wiley, H. W., gives a résumé of his experiments on the excretion of boric acid from the human body.—*Journ. Biol. Chem.*, N. Y., 1907, v. 3, pp. 11-19.

Manwaring and Ruh, in a report on the effect of certain surgical antiseptics and therapeutic agents on phagocytosis, conclude that boric acid in concentration less than $1\frac{1}{2}$ per cent causes a transient stimulation in phagocytosis, followed by a depression. As the concentration increases above $1\frac{1}{2}$ per cent, there is a rapid fall in phagocytic power, phagocytosis apparently completely ceasing soon after the concentration reaches 2 per cent.—*J. Expr. M.*, N. Y., 1907, v. 9, pp. 473-486.

Additional references on the use of boric acid will be found in the *Index Medicus* and the *J. Am. M. Ass.*

ACIDUM CITRICUM.

The curator of the botanical station at Dominica raises the interesting question whether the world's supply of citric acid is all grown within areas dominated by active volcanoes as Sicily, parts of Italy, Montserrat, and Dominica. "Is this," he asks, "merely a coincidence or is it the result of long experience proving that such localities are best suited for the growth of lime and lemon trees?"—*Pharm. J. Lond.*, 1907, v. 25, p. 393.

de Préaudet, G., discusses the production of citric acid in Dominique, the method adopted in producing the citrate of lime, the amount

of citric acid in the compound, and its destination.—*J. d'Agric. trop. Par.*, 1907, v. 7, p. 60.

An editorial, in discussing the production of citric acid in the Seychelles, points out that the Imperial Institute has reported very favorably on a sample of citrate of lime prepared in the island of Silhouette, which yielded 66.89 per cent of citric acid. This result has led to the erection of the necessary machinery for the production of the acid on a large scale.—*Chem. & Drug.*, Lond., 1907, v. 70, p. 936.

Gehe & Co. (*Handels-Bericht*, 1907, pp. 52–53) discuss the economic conditions prevailing in the market for citric acid, and point out that the export of the crude product from Messina has decreased from 5,808 barrels in 1903–4 to 5,735 barrels in 1904–5.

Mitchell, Edward, asserts that citric acid is one of the most troublesome items; that supplied by the manufacturers is usually pure, so far as U. S. P. requirements go, but is often unsatisfactory from physical tests. Crystallization imperfect and color a little off.—*Proc. Arkansas Pharm. Ass.*, 1907, p. 90.

White, Edmund, describes citric acid, enumerates the changes to which citric acid used as a reagent should correspond, and calls attention to some of the trade varieties.—*Pharm. J. Lond.*, 1907, v. 25, p. 747.

An abstract outlines a modification of the Ph. Germ. test for tartaric acid and sugar in citric acid.—*Am. Druggist*, N. Y., 1907, v. 50, p. 136.

Caspari, Chas. E., (Com. on Adulterations) examined 12 samples: 10 satisfactory, 2 contained metallic impurities.—*Proc. Missouri Pharm. Ass.*, 1907, p. 144.

Patch, E. L., examined 22 lots, 99 to 100 per cent pure. Trace of sulphate and iron in three lots.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

Blome, Walter H., (Com. on Adulterations) reports that many samples of citric acid contain either sulphuric acid, tartaric acid, or iron.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Bachman, Gustav, (Com. on Adulterations) reports citric acid which was found to be C. P. according to the U. S. P. requirements.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 41.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 17) report the average amount of lead found in citric acid to be 0.0007 per cent, and only on three occasions did it reach their limit of 0.002 per cent. The quantity of arsenic was proved in every case to be below one part per million. Four Samples left weighable amounts of mineral matter of 0.07, 0.08, 0.07, and 0.12 per cent.

Philipp Röder, Wien, reports that of eight samples of citric acid examined two contained heavy metals and two sulphuric acid and

iron. The test for absence of tartaric acid and sugar, heating for one hour with concentrated sulphuric acid, is best carried out at from 80 to 85° C.; a higher temperature is to be avoided.—Pharm. Post, Wien, 1907, v. 40, p. 323.

Robertson, Illmen, and Duncan present some observations on the influence of citric acid on the coagulation of the blood, and conclude that they have been able to show that citric acid prolongs the coagulation time, and it seemed, even when the difference in time before and after its use was not a very material one, that the viscosity of the blood was lessened.—Tr. Am. M. Ass. Sec., Pharm. and Therap., 1907, pp. 51-77.

ACIDUM HYDRIODICUM DILUTUM.

White, Edmund, describes hydriodic acid, gives tests for phosphates, chlorides, and bromides, and describes the trade varieties.—Pharm. J. Lond., 1907, v. 25, p. 815.

Bachman, Gustav, (Com. on Adulterations) reports syrup of hydriodic acid ranging from 0.83 per cent to 0.54 per cent, instead of 1 per cent, as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

ACIDUM HYDROCHLORICUM.

Denssen, Ernst, (Z. anal. Chem., 46, 320-323, 1907) describes a method for the qualitative and quantitative determination of sulphuric acid in hydrochloric acid based upon the fact that sulphates may be reduced to sulphides even in the presence of fluorides.—Chem. Abstr. Am. Chem. Soc., 1908, v. 2, p. 243.

Philipp Röder (Jahresbericht Wien, 1907, p. 17), reports that of four samples of hydrochloric acid examined one contained considerable iron.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 24) have noticed many samples of the "commercially pure" acid which contain arsenium in excess of the stringent limit (i. e., less than three-tenths of a part per million) of Messrs. Dunstan and Robinson. One part per million was found on several occasions.

Blome, Walter H., (Com. on Adulteration) reports on two samples of dilute hydrochloric acid—11.72 and 7.62 per cent of absolute acid, respectively.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Feldman, S. H., examined ten samples of diluted hydrochloric acid which varied from 9.5 to 12.3 per cent of HCl.—Am. J. Pharm., Phila., 1907, v. 79, p. 367.

Tixier, Léon, presents some interesting and suggestive results of his study of experimental anæmias consecutive to pyloric ulcerations determined by hydrochloric acid.—Compt. rend. Soc. de biol., Par., 1907, v. 62, pp. 1041-1042, 1113-1114.

Additional references on the use of hydrochloric acid will be found in the Index Medicus and the J. Am. M. Ass.

ACIDUM HYDROCYANICUM DILUTUM

Greenish, Henry G., points out that the international agreement for diluted hydrocyanic acid requires 2 per cent. All pharmacopœias agree.—Pharm. J., Lond., 1907, v. 24, p. 832.

An editorial points out that in the protocol of the international convention for the unification of the official formulas for potent medicaments the strength of dilute hydrocyanic acid, which was originally given as 2 per cent, has been altered to 3 per cent.—*Ibid.*, v. 24, p. 101.

Eichinger, A., reviews the observations that have been made regarding the occurrence of hydrocyanic acid yielding glucosides in nature.—Pharm. Ztg. Berl., 1907, v. 52, pp. 146-147.

Hérissey, H., reports a study of prulaurasin, the hydrocyanic acid yielding glucoside of the leaves of *Prunus lauro-cerasus*.—Arch. d. Pharm., 1907, v. 245, pp. 463-468.

Also discusses the hydrocyanic acid yielding glucoside of the seeds of *Eriobotrya japonica*.—*Ibid.*, v. 245, pp. 469-474.

Bourquelot and Hérissey discuss the isomery of the hydrocyanic acid yielding glucosides, sambunigrin, and prulaurasin.—*Ibid.*, v. 245, pp. 474-480.

Hérissey, H., discusses the isolation of prulaurasin by means of the action of a soluble ferment on isoamylgdalin.—*Ibid.*, v. 245, pp. 638-640.

Dunstan and Henry (Ann. Chim. et Phys., 8. ser., 10, 1907, Jan., pp. 118-125) summarize investigations relating to the occurrence of cyanogenetic glucosides in varieties of *Phaseolus lunatus*. The claim made by some investigators that in the Java beans and some other varieties of *P. lunatus* several distinct glucosides are to be found is, in their opinion, not well taken, as they believe that they are merely forms of phaseolunatin.—Exp. Sta. Rec., 1906-7, v. 18, pp. 728-729.

Pollacci, T. (Boll. Chim. Farm., 1907, 287), observes that the nature of the black substance which forms by the slow decomposition of prussic acid has been the subject of much conjecture. A product of somewhat similar appearance is formed by the decomposition which occurs with explosive violence, when the concentrated acid, 90 to 100 per cent, is stored in glass. This substance is light, black, and shows bright points resembling anthracite. It is considered to be a polymer of HCN. It contains no ammonia, as such. When slowly heated it constantly evolves hydrocyanic acid and ammonia until it is dissipated at about 500° C.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 272.

Gilmour, J. P., reports 13 out of 34 samples not in compliance with Ph. Brit. requirements; average deficiency, 12.5 per cent.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

ACIDUM HYPOPHOSPHOROSUM.

Murray, Benjamin L., thinks the specific gravity of hypophosphorous acid as given does not indicate its strength with sufficient accuracy to be retained in the Pharmacopœia.—Merck's Report, N. Y., 1907, v. 16, p. 249.

Steels, Bertram Dillon, discusses the velocity and mechanism of the reaction between iodine and hypophosphorous acid.—J. Chem. Soc. Lond., 1907, v. 91, pp. 1641-1659.

Gane, E. H., reports that one maker's product invariably contains calcium oxalate. Six lots examined showed 48.04 per cent, 49.68 per cent, 50 per cent, 50 per cent, 50.3 per cent, 50.4 per cent of hypophosphorous acid.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 322.

Patch, E. L., examined four samples which contained calcium oxalate and one contained iron.—*Ibid.*, v. 55, p. 322.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 25) found commercial samples to contain heavy traces of calcium.

ACIDUM LACTICUM.

Murray, Benjamin L., points out that the "purity rubric" for lactic acid requires not less than 75 per cent of acid and about 25 per cent of water; the specific gravity requires about 85 to 88 per cent acid and 12 to 15 per cent of water; while the assay again requires not less than 75 per cent acid. The specific gravity is out of harmony with the other requirements. The 75 per cent acid has a specific gravity about 1.175 at 25° C.—Merck's Report, N. Y., 1907, v. 16, p. 248.

Schäfer, V., discusses the advances that are being made in the chemistry of lactic acid and outlines the several processes now used for its production.—Chem. Ztschr., 1907, v. 6, pp. 177-180.

Nussbaum discusses the wide distribution of lactic acid bacillus.—Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 617.

Heinemann (J. Biol. Chem. 2, 603-612, 1907) gives the result of his experiments to ascertain the discrepancies of the results of experiments of various workers on the kind of lactic acid formed in milk that has undergone natural souring.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1882.

Jones, Basil, (Austral J. Dent.) discusses the use of lactic acid in root-canal treatment and for the removal of discolored dentin in deep-seated cavities.—Dental Cosmos, Phila., 1907, v. 49, p. 648.

Sellers, T. Blanchard, states that he has given the lactic acid treatment of digestive disorders a trial, and he believes it to be of less value than beta naphthol and salicylic acid and not to be compared with castor oil.—Brit. M. J., 1907, v. 2, p. 526.

ACIDUM NITRICUM.

Waddell, John, discusses the origin of nitric acid, its occurrence in the Chile deposits and the modern methods of obtaining nitric acid. He asserts that the electrical process so far can not compete with the natural product.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, July 1, p. 28F.

An editorial reviews the history of the electro-chemical fixation of nitrogen from its original suggestion at the Royal Society *soirée* in 1892, by Sir William Crookes to the present time.—Pharm. J. Lond., 1907, v. 24, p. 76–77.

Russ, Franz, discusses the burning of air by means of high tension electric currents and the possibilities of commercial utilization.—Oesterr. Chem. Ztg., Wien, 1907, v. 10, pp. 237–242.

An unsigned article describes and illustrates the Thomas Barry process for the manufacture of nitric acid from air.—Sc. Am. Suppl., N. Y., v. 64, pp. 393–394.

Frankland, Percy F., presents a brief historical review of the discoveries and investigations which have laid the foundation for the processes at present in operation for fixing atmospheric nitrogen, discusses the utilization of atmospheric nitrogen for industrial purposes, and describes and figures some of the apparatus used.—J. Soc. Chem. Ind., 1907, v. 26, pp. 175–180.

Birkeland, K., (*L'industria chimica*, 7, 45–48; see also editorial 41–45) gives a brief description of the electrical method devised by him and Eyde for the fixation of atmospheric nitrogen.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1460.

Klason and Carlson report a series of experiments on the hydrolysis of alkali nitrates as a contribution on the constitution of nitric acid.—Ber. d. deut. chem. Gesellsch., 1907, v. 40, III, pp. 4183–4191.

Collins, Stanley W., discusses the possible use of the "nitron" method for the estimation of nitric acid. He records a series of experiments showing the degree of accuracy which might be expected when working with solutions containing pure nitrates in known quantities.—Analyst, London, 1907, v. 32, pp. 349–351.

Litzendorff, Jakob, reports experiments on the use of nitron as a reagent for nitric acid and nitrates.—Ztschr. f. ang. Chem. Berl., 1907, v. 20, p. 2209.

Maderna and Coffetti (*Gazz. chim. ital.*, XXXVII, I. 595–598, 1907) discuss the determination of nitrous acid and its separation from nitric acid.—Physikal. Chem. Centralb., 1907, v. 4, pp. 469–470.

Wagner, H. W. (*Pharm. Zentralhalle*, 48, 1907, pp. 5–7), recommends a slight modification of Sprengler's phenol test for the detection of nitric and nitrous acids.—Exp. Sta. Rec., 1907–8, v. 19, p. 109.

Gilmour, J. P., reports 8 out of 14 samples not in compliance with Ph. Brit. requirements; average deficiency 4.28 per cent.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

Raue, C. Sigmund, employs nitric acid for the deep irregular ulcers on the borders of the tongue, on the tonsils and the soft palate.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 528.

Uhle and MacKinney state that nitric acid employed judiciously gives the best results in the cauterization of chancroid. The use of cocaine and of antiseptics, as well as a number of dusting powders, is also mentioned.—N. York M. J., 1907, v. 86, p. 111.

For additional references on the use of nitric acid, see J. Am. M. Ass.

ACIDUM OLEICUM.

Gunn and Harrison outline a method for the detection of iron in oleic acid by means of adrenine.—Pharm. J. Lond., 1907, v. 25, p. 181.

Gilmour, J. P., reports 2 out of 5 samples not up to Ph. Brit. requirements; palmitic and stearic acids present.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

Evans Sons Lescher and Webb (Analytical Notes, 1907-8, p. 34) find the specific gravity of oleic acid to range from 0.899 to 0.902. They assert that the limit of impurity given in the Ph. Brit. is rather too severe for commercial samples.

ACIDUM PHOSPHORICUM.

Richardson, W. D., makes a contribution to the determination of phosphoric acid volumetrically.—J. Am. Chem. Soc., 1907, p. 1314.

Jørgensen, Gunner, discusses the determination of phosphoric acid as phosphomolybdic acid and outlines the method followed by him. He concludes that a direct method as outlined and discussed by him would have a degree of accuracy of about 1:100, and while this may suffice for many purposes he does not believe it to be comparable with other available methods.—Ztschr. f. anal. Chem., 1907, v. 46, pp. 370-372.

Kline and Graham assert that almost all of the syrupy phosphoric acid on the market will deposit silica when diluted.—Proc. Pennsylvania Pharm. Ass., 1907, p. 82.

Patch, E. L., examined 11 lots which varied from 85.7 to 89.48 per cent. Three samples contained iron and sulphate.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 322.

Bachman, Gustav, (Com. on Adulterations) reports phosphoric acid ranging from 46.2 per cent to 31.6 per cent instead of 50 per cent, as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Adams, E. O., points out that phosphoric acid is the remedy of choice in cases of functional indigestion accompanied with weakness of the memory.—Tr. Am. Inst. Homœop., 1907, v. 63rd session, p. 368.

Carpenter, W. B., presents a number of "phosphoric acid pictures" and points out the possible application of this remedy in the conditions indicated by these pictures.—*Ibid.*, 1907, pp. 276–280.

ACIDUM SALICYLICUM.

Philipp Röder (Jahresbericht, Wien, 1907, p. 18) reports that 2 samples of salicylic acid examined melted at from 158° to 159°.

Bigelow and Howard (The Caterer) outline methods for the detection of salicylic acid. They suggest the use of chloroform for washing out the mixture. The resulting salicylic acid is then tested with iron.—Mdl. Drug., Columbus, 1906–7, v. 8, p. 493.

Filippi, E., outlines a modification of the Lagrange method for the quantitative determination of salicylic acid which consists in adding an excess of bromine water, of known strength, and determining the excess of bromine with the aid of potassium iodide N/10 thiosulphate solution and titrating this back with N/10 iodine.—Jahresb., d. Pharm. Göttingen, 1907, v. 42, p. 228.

Evans Sons Lescher and Webb (Analytical Notes, 1907–8, p. 5) found the melting point of 8 samples (undried) of acetyl salicylic acid to range from 131° to 135° C. and of 3 other samples 121° to 124° C.

Dubois, W. L., discusses the use of carbon bisulphide in the estimation of salicylic acid in wine.—J. Am. Chem. Soc., 1907, v. 29. pp. 293–294.

Carletti, Ottorino, points out that commercial salicylic acid is frequently contaminated with other phenol derivatives and outlines a test which depends on the trituration of the suspected material with water, adding a few drops of a 2 per cent alcoholic solution of furfural and underlaying the mixture with strong sulphuric acid. The presence of phenol is indicated by a yellow ring which changes to deep blue.—Boll. chim. farm. Milano., 1907, v. 46, p. 421.

Blome, Walter H., (Com. on Adulterations) reports that one sample out of ten showed presence of a small amount of easily carbonizable substances.—Proc. Michigan Pharm. Ass., 1907, p. 70.

The inspectors of pharmacies assert that salicylic acid frequently contains benzophenol, which may be detected by heating the suspected sample to 70° C., at which temperature phenol is liberated.—Ann. de pharm., Louvain, 1907, v. 13, p. 324.

Davis, N. S., discusses the use of salicylic acid and of its several compounds in the treatment of rheumatism.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, p. 114.

Wiley, H. W., presents in abstract the general results of the investigations showing the effect of salicylic acid and salicylates upon digestion and health.—*Analyst*, London, 1907, v. 32, pp. 19–20.

The editor of the Therapeutics column discusses intestinal antiseptics and calls attention to the amounts necessary to maintain an antiseptic action. He states that while clinical experience has shown that some of the intestinal antiseptics are useful in certain diseased conditions, our knowledge does not afford the data for a precise comparison and determination of their relative value.—*J. Am. M. Ass.*, 1907, v. 48, p. 2159.

Stookey and Morris report experiments on the influence of salicylic acid upon uricolysis and an increased ability to destroy uric acid on the part of the kidney, muscle, spleen and liver taken from the dogs treated with sodium salicylate is noticeable.—*J. Expt. M. N. Y.*, 1907, v. 9, pp. 312–313.

ACIDUM STEARICUM.

Emerson, W. H., discusses the solubility of stearic acid in ethyl alcohol at zero in connection with the Hehner and Mitchell method for the determination of stearic acid.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 1750–1757.

Graham, Willard, examined three samples of stearic acid which ranged in melting point from 56.5° C. to 57° C., congealing point from 54° C. to 55° C., being normal in their physical appearance and undecomposed fat.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 326.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 44), found 8 samples having acid values from 203 to 210 and melting points from 54° to 57° C.

ACIDUM SULPHURICUM.

An unsigned abstract (from *Moniteur Scientifique*, Nov., 1906), outlines and discusses the methods employed for the production of sulphuric acid in the United States.—*Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich.*, 1907, v. 45, pp. 107–109.

Schweitzer, Hugo, briefly outlines the origin of the contact process for the manufacture of sulphuric acid.—*Am. Druggist*, N. Y., 1907, v. 50, p. 193.

Wöhler, Foss, and Plüddemann (*Chem. Ber.*, Bd. 39, p. 3538–3549, 1906), present a contribution to our knowledge of sulphuric acid production by the contact method.—*Physikal. Chem. Centralbl.*, 1907, v. 4, p. 45.

Zanner, A., reviews the production of sulphuric acid and the possible utilization of the lost heat.—*Ztschr. f. ang. Chem. Berl.*, 1907, v. 20, pp. 6–9.

Peterson, H., discusses the utilization of the lead chamber process for the production of sulphuric acid and outlines with diagrams his ideas of an intensive method for the production of sulphuric acid.—*Ibid.*, v. 20, pp. 1101–1105.

Raschig, F., discusses the chemistry of the lead chamber process for the production of sulphuric acid, and criticises the work of Lunge and Berl on the lead chamber process and the oxides of nitrogen.—*Ibid.*, v. 20, pp. 694–722.

Feigensohn, M., discusses the relative value of some of the modern innovations in the lead chamber process for sulphuric acid.—*Oesterr. Chem. Ztg.*, Wien, 1907, v. 10, pp. 177–181.

Inglis, J. K. H., presents some observations on the importance of nitre in the chamber process of the manufacture of sulphuric acid.—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, pp. 668–670.

Tower, O. F. (*ZS. f. anorg. Chem. Bd.*, 50, p. 382, 1906), discusses the solubility of nitric oxide and of air in sulphuric acid, reports a number of experiments, and concludes that the numbers obtained are so small that the solubility of these gases in sulphuric acid can cause no appreciable error in the determination of nitrates, nitrites, or the oxides of nitrogen by Lunge's method.—*Physikal. Chem. Centralbl.*, 1907, v. 4, p. 39.

Hart, Wm. B., presents some observations on the influence of physical condition and chemical composition of commercial lead on its durability for pan-concentration of sulphuric acid.—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, pp. 504–511.

Richardson, F. W., discusses the preparation of standard sulphuric acid. He asserts that a solution of barium hydroxide is well adapted for the quick and accurate standardization.—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, p. 78.

Friedheim and Nydegger believe that benzidin will prove to be a useful reagent for sulphuric acid in all cases where no other substance reacting with benzidin is present.—*Ztschr. f. ang. Chem. Berl.*, 1907, v. 20, pp. 9–22.

Bachman, Gustav. (Com. on Adulterations), reports 3 samples supposed to be U. S. P., which were analyzed with the following results: 1st, 19.54 per cent; 2nd, 17.3 per cent; and 3rd, 16.8 per cent.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 41.

Gilmour, J. P., reports 4 out of 15 samples not up to Ph. Brit., traces of As.—*Year Book of Pharmacy*, Lond., 1907, pp. 446–455.

MaWhinney, Elgin (*Am. Dent. J.*), thinks aromatic sulphuric acid will often do as well as 25 per cent phenol-sulphonic acid in the treatment of pyorrhoea alveolaris.—*Dental Cosmos*, Phila., 1907, v. 49, p. 213.

Mason, Robert, discusses the use of aromatic sulphuric acid in toxemia. He asserts that it will arrest suppurative action, and, if given in time, will prevent suppurative action.—*Med. Rec.*, N. Y., 1907, v. 71, p. 448.

ACIDIUM SULPHUROSUM.

Baur, E., presents a contribution to our knowledge of sulphurous acid.—*Arb. a. d. k. Gsmdhtsamte*, Berl., 1907, v. 26, pp. 269–296.

Baur and Kern discuss the electrolytic dissociation constants of sulphurous acid.—*Ibid.*, v. 26, pp. 297–300.

Gilmour, J. P., reports 6 out of 8 samples not up to Ph. Brit. requirements; average deficiency 21.87 per cent, hardly ever full strength unless fresh.—*Year Book of Pharmacy*, Lond., 1907, pp. 446–455.

Wiley, H. W., presents a report on the results of investigations made to determine the effects of sulphurous acid and sulphites on digestion and health.—*Bull. Bur. Chem.*, U. S. Dept. Agric., No. 84, Part 3, pp. 761–1040.

The general results of this investigation are presented as Circular No. 37, *Bur. Chem.*, U. S. Dept. Agriculture.

An editorial comments on the above.—*Lancet*, Lond., 1907, v. 173, p. 1700.

ACIDUM TANNICUM.

Mitchell, Edward, points out that his firm now sells four times as much of U. S. P. tannic acid as formerly, due, he thinks, to the fact that they now supply U. S. P. on all unspecified orders. Formerly, following trade usage, they sent commercial unless U. S. P. was named.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 307.

Brissemoret, A., makes a contribution to the study of the color reactions of tannoids. He points out that while the constitution of the tannins is still obscure, the several groups can be distinguished.—*Bull. d. sc. pharmacol. Par.*, 1907, v. 14, pp. 504–513.

Jean and Frabot find that formol in the presence of hydrochloric acid permits the classification and differentiation of tannin containing matters and serves for the estimation of catechuic tannins, either alone or mixed with other tannins. Their process is claimed to be constant as to results rapid and simple in operation, and applicable to the examination of extracts, juices, etc., containing tannin.—*Ann. de chim. analyt. Par.*, 1907, v. 12, pp. 49–52.

Procter and Bennet (*Jour. Soc. Chem. Indus.*, 26, 1907, No. 3, pp. 79–80) discuss the preparation of hide powders and give the details of a method for the determination of tannins, which, it is urged, should be adopted by the associations interested in this work.—*Exp. Sta., Rec.*, 1906–7, v. 18, p. 813.

An unsigned article (Collegium, 1907, No. 266, pp. 249-254) gives the final recommendations of the international commission appointed at the 1906 conference of the International Association of Leather Trades Chemists to investigate and make comparative tests of various methods of tannin analysis with a view of selecting the most satisfactory.—*Ibid.*, v. 19, p. 309.

Glücksman, C., presents a contribution to the knowledge of tannin in which he discusses the constitution of tannin, the acid number, the use of tannin as a tanning material and the theory of tanning.—Pharm. Prax. 1907, v. 6, pp. 113-122, 168-181, 201-208, 250-255.

Caspari, Chas. E., (com. on adulterations) examined 7 samples; none U. S. P.; 7 not completely soluble in water.—Proc. Missouri Pharm. Ass., 1907, p. 143.

Troxell, H. L., (com. on adulterations) found several samples to be not perfectly soluble in water and the aqueous solution was of dark color, which shows imperfect purification.—Proc. Maryland Pharm. Ass., 1907, p. 85.

Philipp Röder (Jahresbericht, Wien, 1907, p. 18) reports that of 5 samples of tannic acid examined, 1 was objected to because of imperfect solubility and dark color, and 1 because of an abnormally high water content—13.08 per cent. The water content of the remaining 3 samples varied from 7 to 9 per cent.

ACIDUM TARTARICUM.

Gehe & Co. (Handels-Bericht, 1907, pp. 55-56) discuss the production of tartaric acid and the export of this article from Germany.

Mestrezat discusses the oxidation of tartaric and malic acids and their manganometric estimation.—Ann. de chim. analyt., Par., 1907, v. 12, pp. 173-178.

Tagliavini, Achille, outlines a characteristic reaction for tartaric acid.—Boll. chim. farm., Milano, 1907, v. 46, pp. 493-495.

Alderson, F. H., referring to the "cream of tartar standard" adopted by traders and analysts, in which the limit of impurity in cream of tartar is fixed at amounts not exceeding 0.002 per cent of lead and 0.00014 per cent of arsenic, reports that five samples examined by the public analyst contained 0.56, 0.42, 0.14, 0.084, and 0.224 grains of lead per pound, respectively.—Brit. Food J., Lond., 1907, v. 9, p. 113.

Bachman, Gustav, (com. on adulterations) reports tartaric acid which was found C. P. according to the U. S. P. requirements.—Proc. Minnesota Pharm., 1907, p. 41.

Caspari, Chas. E., (com. on adulterations) examined 5 samples; 4 satisfactory, 1 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1907, p. 142.

Patch, E. L., examined 35 lots; 99.4 per cent to 99.8 per cent pure. Four contained traces of copper, 9 traces of iron and excess of sulphate.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 45) examined about 130 samples of powder and crystal acid which, in the main, contained lead below 0.002 per cent and arsenium below 1 part per million. Several lots of foreign crystals gave lead up to 0.007 per cent and ash to 0.5 per cent. No pronounced arsenical contamination was detected.

The inspectors of pharmacies assert that tartaric acid frequently contains a trace of sulphuric acid or of lead.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 325.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 19) reports one sample of tartaric acid which contained considerable ash, some sulphuric acid and heavy metals.

An editorial discusses the contamination of tartaric acid by lead and arsenic. Trade samples of this compound are not infrequently reported by analysts to be unsatisfactory as regards lead and arsenic, and samples representing the produce of certain foreign countries, especially Spain and Italy, are more frequently objected to than others.—*Pharm. J. Lond.*, 1907, v. 24, pp. 551-552. (See also p. 554.)

Additional references on the testing of tartaric acid and its determination in wine and cider will be found in the Experiment Station Record and in Chemical Abstracts.

ACONITINA.

Béguin, Ed., discusses the observations made by Richard, Alvarez, and others on the properties and reactions of aconitine. Schweiz.—*Wehnschr. f. Chem. u. Pharm.*, Zürich, 1907, v. 45, pp. 143-145.

Gordin, H. M., reviews the literature on the progress in our knowledge of the chemistry of aconitine recorded during 1906.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 169.

Murray, Benjamin L., thinks the existence of "aconitine permanganate" is highly improbable.—*Merck's Report*, N. Y., 1907, v. 16, p. 249.

Patch, E. L., asserts that aconitine can be found answering all the U. S. P. tests except that with permanganate.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

The inspectors of pharmacies point out that aconitine of commerce varies considerably in its action, and that it is unsafe to use this substance unless the physician is assured of its nature and origin.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 325.

ACONITUM.

Schneider, Albert, points out that *Aconitum napellus*, L., is grown extensively throughout California as a garden plant. He asserts that some has escaped from cultivation and that it could, no doubt, be very profitably grown in California.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 140.

Holm, Theo., describes and figures *Aconitum uncinatum* L., and gives a number of illustrations showing the structural characteristics of different portions of this plant.—Merck's Report, 1907, v. 16, pp. 65-67.

Puckner, W. A., reviews the literature on the estimation of aconite, published during the year 1906.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 306.

Kebler, Lyman F., points out that for aconite root the aliquot gravimetric results showed less variation than the U. S. P. method. The U. S. P. gave a maximum of 0.499 and a minimum of 0.335 per cent of alkaloids, and the aliquot part method a maximum of 0.612 and a minimum of 0.447.—Proc. Ass. Off. Agric. Chem. 1907, 24th Ann. Conv., p. 85 (Bull. Bur. Chem. U. S. Dept. Agric., 1908, No. 116).

Caesar and Loretz (Geschäfts. Ber., 1907, p. 111), recommend their assay method for belladonna root for aconite and point out that 1 cc. of N/10 acid is the equivalent of 0.0645 aconitine. The Ph. Germ. requires 0.516 per cent, Ph. Belg. 0.8 per cent, and the U. S. P. 0.5 per cent of aconitine.

Sayre, L. E., reports on 2 assays of aconite root which yielded 0.256 and 0.1972 gms. of aconitine in 100 cc., respectively.—Bull, Kansas Bd. Health, 1907, p. 46.

Hankey, W. T., reports aconite root uniformly below the U. S. P. standard. It should be 0.4 per cent instead of 0.5 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 322.

Gane, E. H., examined five lots varying from 0.51 to 0.6 per cent aconitine.—*Ibid.*, v. 55, p. 322.

Patch, E. L., examined 4 samples of whole aconite root varying from 0.46 per cent to 1.05 per cent; 2 ground containing 1.03 and 0.576 per cent, and 1 powdered containing 0.42 per cent.—*Ibid.*, v. 55, p. 322.

Blome, Walter H. (com. on adulterations), reports on one apparently old sample of powdered aconite root, which was very active physiologically.—Proc. Michigan Pharm. Ass., 1907, p. 66.

Vanderkleed, Charles E., reports 8 assays of aconite root of very good quality, ranging from 0.527 to 1.160 per cent of aconitine.—Proc. Pennsylvania Pharm. Ass., 1907, p. 87.

Caesar and Loretz (*Geschäfts. Ber.*, 1907, p. 62), assert that aconite has been comparatively unsatisfactory, the alkaloid content of the better grades varying from 0.500 to 0.650 per cent.

Philipp Röder reports on one sample of aconite root which contained 0.46 per cent of alkaloid and 5.77 per cent of ash.—*Pharm. Post*, Wien, 1907, v. 40, p. 363.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 5), found a sample of aconite root of German origin to yield 0.17 per cent of aconitine, when assayed by the U. S. P. VIII process. About 0.4 per cent was obtained from the English samples examined.

Bührer, C., points out that while the international protocol requires 0.05 per cent of total alkaloid in tincture of aconite the Ph. Belg. and the U. S. P. require 0.045, while the Ph. Ndl. is content with 0.025 per cent. The Ph. Hisp. does not require an alkaloidal assay.—*Schweiz. Wchnschr. f. Chem. u. Pharm.*, Zürich, 1907, v. 45, p. 419.

Greenish, Henry G., also calls attention to this present variation.—*Pharm. J.*, Lond., 1907, v. 24, p. 832.

Gane, E. H., points out the possible variations in the per cent content of alcohol in fluid extract of aconite depending on the amount of moisture and extractive contained in the drug. One sample contained 60.5 per cent by weight, or 68.17 per cent by volume, of absolute alcohol. Distilled, it gave 66.4 per cent by volume.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 318.

Caldwell, Paul, points out that 1 ounce of liniment of aconite and chloroform contains 1 dram of chloroform and 62 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 204.

Wright, R., working on the determination of the alkaloids in chloroform of aconite, obtained results which prove without doubt the superiority of the "Codex" process. It takes out practically all the alkaloids quickly, and with very little waste of menstruum.—*Year Book of Pharmacy*, Lond., 1907, pp. 367–373. (See also *Pharm. J.*, Lond., 1907, v. 25, pp. 66, 107.)

Felter discusses the therapeutics of aconite.—*Eclectic M. J.*, 1907, v. 67, pp. 565–566, 626–627.

Rosenberger, A. S., points out that in one epidemic of influenza aconite was the remedy in the febrile stage and in some cases was all that was needed.—*Tr. Am. Inst. Homœop.*, 1907, 63rd session, p. 418.

Kinyon, C. B., recommends aconite in cases of acute ovaritis with very severe pain; also for sudden suppression from cold (chill), fright, or anger.—*Ibid.*, 1907, 63rd session, p. 368.

Webb, Walter J., relates that a woman received by mistake four teaspoonfuls of a mixture of equal parts of tincture of aconite and tincture of belladonna in a space of 3 hours, but recovered, recovery being attributed to the antidotal action of the atropine for the aconite,

and to the fact that vomiting and purging took place.—N. York M. J., 1907, v. 85, p. 286.

ADEPS.

Lücker, Edward, asserts that American lard has a higher acid number than the German product and is readily recognized by its disagreeable odor.—Apoth. Ztg., Berl., 1907, v. 22, p. 1045.

Leys, A. (Comptes rend., 1907, 145, 199), outlines a method for the detection of foreign fats in lard. This depends on the fact that when fats containing solid glycerides are treated with glacial acetic acid and mercuric acetate the latter separate out on cooling practically free from adhering olein.—Pharm. J., Lond., 1907, v. 25, p. 315.

McPherson and Ruth contribute a paper on corn oil, its possible use as an adulterant in lard and its detection.—J. Am. Chem. Soc., 1907, v. 29, pp. 921-926.

Guillot, M. L., (*J. pharm. chim.*, 6, 25, 430-432) examined one sample of lard, purchased for the French army, which was adulterated with water, sodium chloride, and cotton-seed oil. Its color was white; odorless; taste noticeably saline; consistency firm; reaction neutral to litmus; melts at 43° C.; when heated with sulphuric acid, 50°. It contained 11.9 per cent water, 0.584 per cent sodium chloride, 0.702 per cent ash (alkaline), and about 20 per cent cotton-seed oil.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1629.

The inspectors of pharmacies report that lard is frequently adulterated with foreign fats, oils, or water and otherwise leaves much to be desired owing to frequent rancidity.—Ann. de pharm., Louvain, 1907, v. 13, p. 276.

Cohn, Alfred I., thinks that for making benzoinated lard it would be advisable to direct the mixing of coarsely powdered benzoin with an equal weight of clean gravel, enclosing the mixture in a muslin or cheese-cloth bag, and suspending the latter in the lard by a suitable contrivance. If the fabric for the bag is properly chosen there is no need for straining the finished product.—Proc. New York Pharm. Ass., 1907, p. 232.

Vanderkleed, Charles E., (com. on adulterations) points out that samples containing vanillin to give it a benzoinated odor were not so labeled until after the Food and Drugs Act went into effect.—Proc. Pennsylvania Pharm. Ass., 1907, p. 83.

ADEPS LANÆ.

Mitchell, Edward, asserts that a great proportion of the wool-fat offered is not U. S. P. The chlorides have not been eliminated.—Proc. Arkansas Pharm. Ass., 1907, p. 91.

Mossler, G., (*Ztschr. d. Allgem. Oesterr. Ap. Ver.* No. 1, 1907) points out that in testing wool-fat for acidity benzol is a better solvent than ether.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 823.

Klose, G., reports experiments on the quantitative determination of the solubility, at 45° C., of various medicaments in anhydrous lanolin.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, pp. 459–463.

Blome, Walter H., (com. on adulterations) reports anhydrous wool-fat containing a trace of chloride.—*Proc. Michigan Pharm. Ass.*, 1907, p. 71.

Caspari, Chas. E., (com. on adulterations) examined 7 samples, 5 satisfactory; 2 contained traces of fatty acids and chloride.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 30), found the iodine value of several samples of hydrous and anhydrous lanolin to lie between 18.6 and 26.2, eighteen hours being allowed for absorption. The saponification values ranged from 95.1 to 103 ash up to 0.1 per cent, and all were below the Ph. Brit. limit of acidity.

Levy, L. S., (*The American Perfumer*) discusses the use of lanolin, the need for having a refined preparation and some of the advantages that it offers as an ingredient in medicinal preparations, salves, and facial creams.—*Mdl. Drug.*, Columbus, 1906–7, v. 8, p. 300.

A number of references on the use of lanolin will be found in the *Index Medicus*.

ETHER.

Dohme and Englehardt believe it is to be regretted that the U.S.P. did not take up an “*Æther pro narcosi*” with more stringent requirements for its purity. They think the tests rigid enough for a good commercial product, but not for an anesthetic.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 378. •

White, Edmund, gives the physical properties of ether, outlines a number of tests, and also describes “dry ether.”—*Pharm. J. Lond.*, 1907, v. 25, p. 780.

An unsigned article describes and figures a modern ether factory according to the system devised by Eckelt.—*Pharm. Ztg.*, Berl., 1907, v. 52, pp. 169–170.

An editorial points out that the Government permission to employ since September 1, 1907, denatured alcohol in the manufacture of ether has materially reduced the cost of this important article without the slightest deterioration in quality.—*Pacific Pharm.*, San Francisco, 1907–8, v. 1, p. 333.

Fleischer and Frank point out that mixtures of alcohol and ether while miscible with either petroleum benzin or water are separated

when brought in contact with both benzin and water (the alcohol mixing with the water and the ether mixing with the bezin) and propose this as a ready means for determining the relative composition of mixtures of this kind.—*Chem. Ztg.*, Cöthen, 1907, v. 31, p. 665.

Wester, H., (*Pharm. Weekbl.* 1907, 601) criticises the Ph. Ndl. IV acetone reaction and favors the following modification of Froehner's test, which will detect 0.028 per cent of acetone in ether. Three cc. of the ether is shaken up with 1 cc. of a 5 per cent solution of hydroxylamine hydrochloride. A small quantity, about 4 cc., of sodium hypochlorite solution is then added. In the presence of acetone a blue to bluish-green color is formed in the ether layer. Excess of hypochlorite solution should be avoided or it will destroy the color.—*Pharm. Zentralh.*, 1907, v. 48, p. 620.

Wester, D. H., reports some additional observations on the influence of light on ether and mixtures of ether and alcohol that indicate that amber or brown glass has a retarding effect on the decomposition of ether.—*Pharm. Weekbl.*, 1907, v. 44, p. 711.

Blome, Walter H., (com. on adulterations) reports that ordinary ether is usually slightly acid.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

The inspectors of pharmacies assert that samples of ether have been found to be very acid and to leave on evaporation an oily residue that is quite irritating.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 327.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 19) reports one sample of ether having an acid reaction and being therefore objectionable.

Wieder, Henry S., discusses the administration of ether and points out a number of errors that are frequently made by the inexperienced anesthetist.—*Therap. Gaz. Detroit*, 1907, v. 31, pp. 844–848.

Nicloux, Maurice, contributes a study on the quantity of ether in the blood and in tissues.—*Compt. rend. Soc. de biol., Par.*, 1907, v. 62, pp. 68–71, 160–163, 186–189. (See also *Compt. rend. Acad. d. sc. Par.*, 1907, v. 144, pp. 341–344.)

Bailey, Francis W., and Brownlee, Alexander, each contributes a paper on the subject of the administration of ether by the open method.—*Brit. M. J.*, 1907, v. 2, pp. 1823–1825.

Hausmann, W., calls attention to the use of ether as a drink and the possibility of habituating the animal organism to its use.—*Ergeb. d. Physiol.*, 1907, v. 6, p. 94.

Additional references on the use of ether will be found in the *Index Medicus* and the *J. Am. M. Ass.*

ÆTHER ACETICUS.

Patch, E. L., reports the specific gravity of acetic ether at 25° C., 0.876. The standard 0.883 to 0.885. 25 cc. with 25 cc. of water just previously saturated with acetic ether separates 83.6 per cent. Standard, 90 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 325.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 20-) reports one sample of acetic acid boiling at from 65° to 78° C., in place of from 73° to 76° C., the limitations of the *Ph. Austr.* VIII.

ÆTHYLIS CARBAMAS.

The council on pharmacy and chemistry states that urethane is a name commonly applied to æthylis carbamas *U. S. P.*—*J. Am. M. Ass.*, 1907, v. 48, p. 227.

Ethyl Carbamate is official in the *Ph. Helv.* III as urethanum.

ÆTHYLIS CHLORIDUM.

Kailan, A., records a series of experiments on the formation of ethyl chloride with varying concentrations of alcohol and hydrochloric acid.—*Monatsh. f. Chemie*, Wien, 1907, v. 28, pp. 559-569.

Embley, E. H., reports on an experimental study of the pharmacology of ethyl chloride with the view of saving what appears to him to be a valuable anesthetic agent from coming under the suspicion of being unduly dangerous.—*Therap. Gaz.*, Detroit, 1907, v. 31, pp. 799-800.

Maas, Th. A., reviews the use of ethyl chloride as an anesthetic and concludes that it is quite as dangerous as chloroform and does not compare with nitrous oxide in cases where the latter can be used. A comprehensive bibliography is appended.—*Therap. Monatsh.*, Berl., 1907, v. 21, pp. 303-313.

Ingle, Henry B., in discussing anesthesia and methods producing it, points out that ethyl chloride, ethyl bromide, and nitrous oxide are all good for short anesthesia, or may be used preliminary to ether or chloroform.—*Therap. Gaz.*, Detroit, 1907, v. 31, pp. 240-243.

Camus and Nicloux discuss the estimation of ethyl chloride in the blood.—*Compt. rend Soc. de biol. Par.*, 1907, v. 63, pp. 689-691, 692-694, 792-795.

Additional references on the use of ethyl chloride will be found in the *Index Medicus* and the *J. Am. M. Ass.*

ALCOHOL.

Kuhl, Hugo, reviews the history and chemistry of alcoholic fermentation by means of yeast, describes the several forms of yeast, and records a series of experiments to determine the influence on fer-

mentation of various added substances.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 729.

Arauner, Paul, presents a review of the uses of fermentation, the varieties of yeast, and the production of pure yeast cultures.—*Pharm. Ztg.*, Berl., 1907, v. 52, pp. 660–662.

Slator, Arthur, discusses the existence of an intermediary product of alcoholic fermentation and concludes that if such a product exists it is even more readily changed than is glucose itself.—*Ber. d. deutsch. chem. Gesellsch.*, Berl., 1907, v. 40, pp. 123–126.

Wiley and Schreiber discuss the production of synthetic alcohol and review some of the literature relating to the subject. They also describe and figure the apparatus used by the several experimenters.—*Proc. Am. Philosoph. Soc.*, 1907, v. 46, pp. 117–123.

Rüdiger, H., discusses alcohol and the alcohol industry, presents a table giving the production of alcohol in different countries, and includes considerable information on the various methods and processes used in the production of alcohol.—*Chem. Ind.*, Berl., 1907, v. 30, pp. 550–559, 580–582.

Wiley, H. W., (*U. S. Dept. Agr. Bur. Chem. Bull.*, 102, 1906) gives a summary of his investigations in connection with inspection of imported food products. The investigation covered several different lines—the whiskies of Great Britain and Ireland, German wines, French wines and brandies, and canned goods.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 2622.

Gehe & Co. (*Handels-Bericht*, 1907, pp. 56–58) discuss the production and the consumption of alcohol in Germany and present a table showing the comparatively little variation either in the production or the consumption from the years 1900 to 1906, the total production averaging approximately 4,000,000 hektoliters.

Schnabel, C., asserts that the alcohol sold in Germany will not answer the silver-nitrate test and recommends that the requirements be adjusted to existing conditions.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 1119.

An unsigned article illustrated presents a general consideration of the distillation and rectification of alcohol.—*Sc. Am. Suppl. N. Y.*, 1907, v. 63, pp. 26071–26074, 26088–26091.

White, Edmund, describes the physical properties of ethyl alcohol, tests for an article suitable for use as a reagent and discusses the trade varieties of alcohol available in Great Britain.—*Pharm. J. Lond.*, 1907, v. 24, p. 404.

Fleischer and Frank outline a rapid method for the determination of alcohol and ether in mixtures of the two. The method depends on the fact that a mixture of ether and alcohol is miscible with either water or petroleum benzin, but that in the presence of both of these

substances the ether tends to mix with the benzoin while the alcohol mixes with the water.—Chem. Ztg., Cöthen., 1907, v. 31, p. 665.

A method for the analysis of distilled liquors as outlined by the Association of Official Agricultural Chemists includes the determination of absolute alcohol, ethereal salts, aldehydes, furfural, fusel oil, and methyl alcohol.—Bull. Bur. Chem. U. S. Dept. Agric., 1907, No. 107, pp. 95–101.

Coblentz, Virgil, asserts that the Leach-Lythgoe test in its present condition can not be depended on as a general one for the detection of methyl alcohol in mixtures.—Apothecary, Bost., 1907, v. 19, p. 62.

He describes a modification of the Sagle-Ferriere Cumiasse test, so that it can be performed more simply.—*Ibid.*, v. 19, p. 62.

Wolff, J., following up the work of Trillat on the production of polymerization products of formic aldehyde in the course of the combustion of sugar, finds it indispensable to redistill alcohols containing saccharose, invert sugar, or caramel before undertaking an analysis.—Ann. de chim. analyt. Par., 1907, v. 12, p. 470.

Wagner and Schultze discuss the estimation of ethyl alcohol by means of the Zeiss immersion refractometer, review some of the literature, and present their results in the form of a table in comparison with the figures given by Windisch.—Ztschr. f. anal. Chem. Wiesb., 1907, v. 46, pp. 508–514.

Kailan, Anton, reports experiments on the dehydration of alcohol by means of lime and calls attention to the loss of alcohol entailed by the use of an excess of the dehydrating agent.—Monatsh. f. Chem. Wien, 1907, v. 28, pp. 927–946.

Lyons, A. B., presents some new alcohol tables deduced for practical use from the table published by Mosley (J. Am. Chem. Soc., Oct., 1904). The tables give the volume per cent indicated by specific gravity at 15.6° C. and at 25° C. and the corrections for differences in specific gravity.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 353.

Troxell, H. L., (com. on adulterations) states that alcohol is sometimes shipped in insufficiently “pitched” barrels and consequently takes up tannic acid and its related products, which on addition of caustic alkali gives a yellow to brown color. Such an alcohol should not be used in alkaline preparations.—Proc. Maryland Pharm. Ass., 1907, p. 85.

Blome, Walter H., (com. on adulterations) reports that 7 samples left a weighable residue and contained aldehyde, tannin, and a slight trace of methyl alcohol. One sample contained carbonizable impurities in addition to the ones mentioned.—Proc. Michigan Pharm. Ass., 1907, p. 66.

Lythgoe, Hermann C., reports that of 59 samples of alcohol examined, 21 were watered. These samples varied in strength from 45 to

85 per cent of alcohol by volume.—Rep. Massachusetts Bd. Health, for 1907, 1908, p. 379.

Gilmour, J. P., found 45 samples to be of Ph. Brit. standard. Some contained appreciable quantity of aldehyde.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

Wetterstroem, Theo. D., points out that many liniments, hair tonics, and toilet waters, etc., contain 42 to 95 per cent wood alcohol.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 322.

Raubenheimer, Otto, suggests that the committee on revision prepare an official table of the alcohol content—that is, the percentage of *absolute* alcohol in the U. S. P. preparations.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 30.

Stevens, A. B., presents a tabulation of the approximate content of alcohol in fluid extracts and some other pharmacopœial preparations.—Pharm. Era., N. Y., 1907, v. 37, pp. 56, 130.

Caldwell, Paul, presents a list of the alcohol containing preparations of the National Formulary and the maximum percentage content of alcohol.—Drug. Circ., N. Y., 1907, v. 51, pp. 202-205.

Lloyd, J. Uri, (Medical Gleaner) calls attention to the increase of the alcohol strength of pharmaceutical preparations by precipitation and presents a tabulation of a number of preparations freshly assayed and assayed after the precipitation has occurred.—Drug Topics, N. Y., 1907, v. 22, p. 360.

An unsigned article quotes a number of opinions on the published tables of alcohol content of galenical preparations. One observer points out that practically all of the tabulated statements so far published are misleading and are destined to be the source of a great deal of annoyance and misapprehension on the part of retail pharmacists.—Drug. Circ., N. Y., 1907, v. 51, p. 320.

Attention is called to the fact that the Secretary of Agriculture points out that the law is specific regarding the declaration of the quantity or proportion of alcohol present in drug products and suggests that the percentage of alcohol given on the label should be the percentage of absolute alcohol by volume contained in the finished product.—Am. J. Pharm., Phila., 1907, v. 79, pp. 192-193.

An editorial discusses the objection against the use of alcohol, and the prevailing fad affected by some proprietary manufacturers in favor of glycerin.—Pharm. Era, N. Y., 1907, v. 37, p. 317.

An editorial calls attention to the fact pointed out by Grinnell, that the sale of patent medicines containing alcohol, of opium and other habit-forming drugs increases when the sale of alcohol is prohibited.—Brit. M. J., 1907, v. 2, p. 44.

Hunt, Reid, reports studies on experimental alcoholism and points out that the experiments appear to show that moderate amounts of alcohol may cause distinct changes in certain physiological func-

tions, and that these changes may, under certain circumstances, be injurious to the body.—Bull. Hyg. Lab. U. S. P. H. & M.-H. S. No. 33, pp. 43, Feb., 1907.

Mansfeld and Fejes report a series of comparative observations on the toxic effect of alcohol on normally nourished and on fasting animals.—Arch. internat. de Pharmacod. et de Thérap., 1907, v. 17, pp. 353-362.

Gréhan, Nestor, presents a study of the physiologic action of alcohol.—J. de physiol. et de path. gén. Par., 1907, v. 9, pp. 978-986.

Hall, Winfield S., discusses the physiologic effects of alcohol on the human system, and compares its effects with those of food in parallel columns.—J. Am. M. Ass., 1907, v. 48, pp. 393-396.

Hausmann, W., reviews some of the work that has been done on the habituation of the animal organism to alcohol and the functional derangements caused by its use.—Ergeb. d. Physiol., 1907, v. 6, pp. 89-93.

Salant, William, reports a number of experiments to determine the influence of alcohol on the metabolism of hepatic glycogen.—Journ. Biol. Chem., N. Y., 1907, v. 3, pp. 403-418.

An editorial comments on the "storm in a teacup" raised in England by the manifesto favoring the use of alcohol signed by 16 eminent men. The editor states that the manifesto appeared when the British Government was preparing a bill inimical to the liquor interests and it seems a fair deduction that the signers of the manifesto were the unwitting dupes of the liquor interests.—J. Am. M. Ass., 1907, v. 48, p. 2121.

An unsigned article reviews the controversy on the use of alcohol which has been subject of much correspondence in the medical and lay press.—Therapist (The), London, 1907, v. 17, pp. 47-48.

Woodhead, Sims, is quoted as asserting that alcohol was murderous to infants, highly injurious to children, dangerous for youths, unnecessary for healthy parents, and its use as a drug for disease was too perilous, unless prescribed by cultured physicians. He believes no man could do the very best work if he were taking alcohol, and he is prepared to stand by this statement.—Pharm. J. Lond., 1907, v. 25, p. 28.

Additional references on the production and testing of alcohol will be found in Chemical Abstracts and on the use of alcohol in the Index Medicus and the J. Am. M. Ass.

ALCOHOL, DENATURED.

An abstract calls attention to the regulations for the manufacture and sale of denatured alcohol, which appear in Circular 21, issued by the U. S. Internal-Revenue Department.—Pharm. J., Lond., 1907, v. 24, p. 24.

An editorial discusses the future of denatured alcohol, the influence of the regulations that have been promulgated, the influence of the reduction of wood alcohol, and the cost of the denatured product.—*Am. Druggist*, N. Y., 1907, v. 50, p. 2.

Dimmitt, Addison, discusses the use of denatured alcohol and calls attention to the requirements of the United States Government regulating the sale of this product.—*Proc. Kentucky Pharm. Ass.*, 1907, pp. 88–90.

Eberle, E. G., discusses the composition and the use of denatured alcohol. He also reviews the regulations that are in force in some of the foreign countries relating to denatured alcohol and gives some of the more recent figures relating to its popularity and use.—*Proc. Texas Pharm. Ass.*, 1907, pp. 51–56.

An editorial (*Eng. News*, 57, 572) points out that on account of the greatly increased interest in utilization of alcohol due to the passage of the law allowing the production of denatured alcohol in small farm distilleries, the U. S. Dept. of Agriculture has issued *Farmers' Bulletin* 277, treating this subject. A table relative to costs of various fuels for power purposes is given.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 2305.

The new regulations for denatured alcohol are reprinted.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 72, July 29, p. 281.

A book review calls attention to a volume on industrial alcohol, its manufacture and uses, edited by John K. Brachvogel, and published by Munn & Co., New York. The book is largely a translation of the body of the revised edition of the "Introduction to distillation" of Doctor Maercker, to which has been added much valuable information by the translator and the collaborators.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 429.

Bigelow, S. Lawrence, (*University of Mich. Pop. Sci. Monthly*, 70, 243–264) discusses the manufacture of alcohol, the denaturants employed in various countries, and the uses of denatured alcohol. He also discusses the denatured alcohol law and regulations and the probable effect upon the industries.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 1310.

An abstract (from the Fiftieth Report of the Commissioners of His Majesty's Inland Revenue) discusses the use of industrial alcohol, and describes a new variety of methylated spirit now available for industrial purposes. Also gives a table of the quantities of home-made spirit received for the manufacture of methylated spirit during the year.—*Pharm. J.*, Lond., 1907, v. 25, pp. 312–313.

Sy, Albert P., presents a short review of the alcohol industry and the possible importance of the free alcohol law. He summarizes the advantages of alcohol over other fuels, and asserts that alcohol is cheaper, more reliable and efficient; it is much cleaner to handle and

use; there is no danger from poisoning, like there is in the use of natural or manufactured gases.—J. Frankl. Inst., Phila., 1907, v. 163, pp. 57–67.

An editorial calls attention to the amendment to the denatured alcohol law, which, it is thought, will enable farmers and small dealers to engage in the manufacture of that product.—Drug Topics, New York, 1907, v. 22, p. 17.

A news item discusses the amended alcohol regulations.—Oil, Paint and Drug Reporter, New York, 1907, v. 71, April 8, p. 28D. (See also *Ibid.*, April 15, p. 55.)

Eberle, A. R., believes that it would be desirable to tint denatured alcohol and also wood alcohol with an aniline color to prevent the accidental sale or the use of these alcohols for medicinal purposes.—Proc. Wisconsin Pharm. Ass., 1907, p. 67.

A news item records an amendment to the denatured alcohol law which will permit the withdrawal of specially denatured alcohol for the manufacture of ether, chloroform, or other definite chemical substances where the alcohol does not appear as such in the finished product.—Drug. Circ. N. Y., 1907, v. 51, p. 287.

An unsigned abstract enumerates a number of tests devised by Prof. Schmidt and elaborated by Professor Coblenz for the detection of denatured alcohol in various pharmaceutical preparations.—Am. Druggist, N. Y., 1907, v. 51, p. 46.

An editorial points out that the price of wood alcohol has dropped so that it is now a serious competitor to the new form of grain alcohol.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 47.

Farmers' Bulletins No. 268, No. 269, and No. 277 present information on industrial alcohol, its sources and manufacture, uses and statistics, and its possible use in farm engines.

Additional references on the production and uses of denatured alcohol will be found in the Experiment Station Record and in Chemical Abstracts.

ALOE.

Nelson, Burt E., calls attention to the origin of aloes, the appearance of the powdered drug under the microscope, and the characteristic plant structures sometimes found in it.—Merck's Report, N. Y., 1907, v. 16, p. 219.

Schneider, Albert, points out that many species and varieties of aloes are cultivated as ornamental plants. They resemble the century plant (agaves) and thrive well in dry sandy soil. Whether they could be grown profitably for the inspissated juice, which is used medicinally, would have to be determined experimentally.—Pacific Pharm., San Francisco, 1907–8, v. 1, p. 249.

Mitchell, Edward, asserts that most of the stock on the market for some time past has been of the false or Curaçao variety. No small gourds are now in the market. He knows of but one lot of genuine received in this country for some time.—Proc. Arkansas Pharm. Ass., 1907, p. 89.

Cowen, C., (Cape Times) points out that in 1853 the total exports of aloes amounted to 224,542 lbs. while in 1904 the total amount was 647,351 lbs. with a considerable reduction in value. He attributes the falling off in price to inferior quality or irregular methods of preparing the aloes.—Chem. & Drug. Lond., 1907, v. 70, p. 773.

Marloth, R., (Transactions of the South African Philosophical Society, v. 16, part 3, pp. 213–216) asserts that *A. succotrina* Lam. and *A. pluridens* Haw. are not synonyms, as stated by Schönland, but very different from one another. He has found the true habitat of *A. succotrina* on the slopes of Table Mountain and in a postscript also records the finding of a variety of this species among the rocks of little Lionshead near Houtbay.—Bot. Centralbl., 1907, v. 104, p. 61.

Léger, E., contributes a paper on Jafferabad and Uganda aloes.—J. de pharm. et de chim. Par., 1907, v. 25, pp. 476–483.

He presents another paper on barbaloin; its existence in the majority of aloes; its composition and formula.—*Ibid.*, pp. 513–517.

Alvarez, E. Pinerua, in discussing color reactions of some organic compounds, points out that by his process with the hydrate of sodium dioxide, pure ethyl alcohol, and cold water he obtains with emodine an intense rose color, which becomes yellow on the addition of a few drops of acetic acid.—Ann. de chim. analyt. Par., 1907, v. 12, p. 9.

Niece, Frederic E., outlines a color reaction for testing the identity of tincture of aloes.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 481.

Hankey, W. T., points out that the U. S. P. requires that aloes yield a nearly clear solution in warm alcohol. He finds market lots 85 per cent to 95 per cent soluble.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 322.

Blome, Walter H., (com. on adulterations) reports 2 samples of aloes containing gum, dextrin, or inorganic matter. One left only 1.96 per cent of ash.—Proc. Michigan Pharm. Ass., 1907, p. 66.

The inspectors of pharmacies report that aloes continues to be found of inferior quality and frequently contains impurities.—Ann. de pharm. Louvain, 1907, v. 13, p. 275.

Philipp Röder (Jahresbericht, Wien, 1907, p. 21) reports refusing 9 of the 19 samples of aloes submitted. Seven of these samples did not comply with the pharmacopœial requirements for aloes, and 2 additional samples while giving the characteristic reaction with nitric acid contained an excessive amount of ash.

Smith, Otis W., thinks that the point has been reached where aloes may well be abandoned for an equivalent amount of aloin. The latter is now obtainable of uniform quality and at a low price.—Proc. Missouri Pharm. Ass., 1907, p. 135.

Hommell, P. E., thinks the Lady Webster Dinner Pill should be dropped from the U. S. P., as it is rarely prescribed and possesses little value from a therapeutic standpoint.—Proc. New Jersey Pharm. Ass., 1907, p. 62.

Clark, B. G., believes that aloes is an antipsoric, having many symptoms like sulphur. He recommends its use in the treatment of rachitis.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 476.

ALOINUM.

Dohme and Englehardt point out that the requirements of the solubilities of aloin in water, alcohol, and acetone have been reduced by the correction which was necessitated by the fact that the commercial product is not a uniform substance, but consists of at least two bodies.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 378.

Léger, E., discusses the composition, formula, and distribution of barbaloin, and points out that it is generally admitted that barbaloin is a methyl-anthracene derivative.—J. Pharm. Chim., 1907, v. 25, pp. 513–517.

Sayre, L. E., reports examining a sample of aloin which contained 0.28 per cent of ash. He points out that the ash content permitted by the U. S. P. VIII is entirely too low and should be revised.—Bull. Kansas Bd. Health, 1907, p. 12.

Blome, Walter H., (com. on adulterations) reports on 8 samples; 1 left 1 per cent of ash. Solubility of nearly all not in accordance with U. S. P.—Proc. Michigan Pharm. Ass., 1907, p. 66.

ALTHÆA.

Schneider, Albert, points out that native and introduced species of *althæa* occur in great profusion in California, some constituting very troublesome weeds.—Pacific Pharm., San Francisco, 1907–8, v. 1, p. 249.

Stscherbatscheff, D., describes and figures the development of the seed of *Althæa officinalis* L.; also describes the structure of the seed and the development of the root.—Arch. d. Pharm., 1907, v. 245, pp. 60–65.

ALUMEN.

An abstract from the United States Geological Survey discusses the undeveloped alum deposits in the United States.—Paint, Oil and Drug Rev., Chicago, 1907, v. 44, September 4, p. 43.

Gooch and Osborne discuss the reaction between potassium aluminum sulphate and a bromide bromate mixture.—*Ztsch. f. anorg. Chem.*, 1907, v. 55, pp. 188–194.

Scoville, W. L., asserts that clean alum is difficult to get. Always makes cloudy solution and shows presence of iron.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

Patch, E. L., reports samples of powdered alum which made opaque solutions with solvent in excess. Others dissolved clear.—*Ibid.*, v. 55, p. 322.

Blome, Walter H., (com. on adulterations) reports on powdered alum; almost all ammonia alum, very little potassium in the compound. Solubility off.—*Proc. Michigan Pharm. Ass.*, 1907, p. 66.

The inspectors of pharmacies point out that alum frequently contains iron and that ammonia alum has been found in place of potassium alum.—*Ann. de pharm. Louvain*, 1907, v. 13, p. 325.

An editorial discusses the use of alum as a water purifier, and points out that, properly applied (or rather its active constituent, sulphate of alumina), when decomposed by the bicarbonate of lime contained in nearly all waters, precipitates insoluble hydrate of alumina in a gelatinous form, which enmeshes, entangles, and carries down bacterial and suspended matter alike, leaving the purified water brilliantly clear.—*Paint, Oil and Drug Rev.*, Chicago, 1907, v. 43, May 22, p. 22.

ALUMEN EXSICCATUM.

Murray, Benjamin L., points out that the statement "very slowly" soluble is quite appropriate for an article of U. S. P. quality. Sometimes several days are found necessary to dissolve a small quantity of the salt.—*Merck's Report*, N. Y., 1907, v. 16, p. 249.

Blome, Walter H., (com. on adulterations) reports on the examination of 3 samples of burnt alum; 1 contained trace of iron. Two others were essentially ammonia alum, contained almost no potassium, and were very insoluble.—*Proc. Michigan Pharm. Ass.*, 1907, p. 87.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 22) reports that of 3 samples of dried alum examined but 1 complied with the requirements of the pharmacopœia. The other two samples were refused because of their comparative insolubility in water.

ALUMINI SULPHAS.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 23) reports on 5 samples of aluminum sulphate containing traces of iron.

Hébert, Alexandre, discusses the toxicity of the salts of chromium, aluminum, and magnesium, their action on diverse fermentations, and makes a comparison with analogous properties of the rare earths.—*J. de physiol. et de path. gén. Par.*, 1907, v. 9, pp. 751–758.

AMMONII BROMIDUM.

Bachman, Gustav, (com. on adulterations) reports ammonium bromide ranging from 96.4 per cent to 92.3 per cent instead of 97 per cent, as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 40.

Caspari, Chas. E., (com. on adulterations) examined 16 samples, 12 satisfactory; 4 contained excess of chloride.—*Proc. Missouri Pharm. Ass.*, 1907, p. 144.

N. Y. State Board of Health, Eastern Branch, examined 12 samples; 4 deficient.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 23), reports that of 4 samples of ammonium bromide examined, one was objected to because of an excessive amount of sulphate.

AMMONII CARBONAS.

White, Edmund, describes the properties of ammonium carbonate that make it useful as a reagent, gives tests for impurities, and describes the trade varieties.—*Pharm. J. Lond.*, 1907, v. 24, p. 495.

Angelucci, O., (*Gaz. chim. ital.*, 36, II, pp. 517–522, 1906) discusses the synthesis of ammonium carbonate from acetylene and nitrous oxide at high temperatures.—*Physikal. Chem. Centralbl.*, 1907, v. 4, p. 214.

Wilson, L. E., keeps carbonate of ammonia in full strength, by saturating a small piece of cotton or sponge with stronger water of ammonia and placing it in the bottom of the bottle. The blocks of ammonium carbonate will not turn white, crumble, nor lose their ammonia odor and strength.—*Bull. Pharm.*, 1907, v. 21, p. 380.

Blome, Walter H., (com. on adulterations) reports a sample of ammonium carbonate which contained traces of iron.—*Proc. Michigan Pharm. Ass.*, 1907, p. 67.

Patch, E. L., examined 5 samples varying from 94.22 per cent to 96.72 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 322.

Caspari, Chas. E., (com. on adulterations) examined 8 samples, 6 satisfactory; 2 were deficient in ammonia.—*Proc. Missouri Pharm. Ass.*, 1907, p. 144.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 6) report that only 14.6 cc. sulphuric acid were neutralized by 1 gm. of a sample labeled "commercial." Two samples submitted as Ph. Brit. equaled 18.2 and 16.8 cc., respectively.

Kinyon, C. B., recommends ammonium carbonate for severe pains in the back extending through the uterus; menses scanty, too early, but flow is more free at night.—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 384.

AMMONII CHLORIDUM.

White, Edmund, describes ammonium chloride, gives tests for impurities and describes the various trade varieties available, calling attention to the many forms in which this article appears on the market.—Pharm. J. Lond., 1907, v. 24, p. 495.

Blome, Walter H., (com. on adulterations) reports that ammonium chloride contained a small amount of sulphate.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Kline and Graham report examining one sample of ammonium chloride which contained a large percentage of sodium chloride. They point out that when it is so adulterated it is not completely volatile and gives the yellow sodium flame.—Proc. Pennsylvania Pharm. Ass., 1907, p. 82.

The inspectors of pharmacies report finding ammonium chloride contaminated with sodium chloride.—Ann. de pharm. Louvain, 1907, v. 13, p. 326.

Philipp Röder (Jahresbericht, Wien, 1907, p. 24) reports one sample of ammonium chloride which left on incineration a residue amounting to 18.2 per cent, consisting largely of calcium and sodium chloride.

AMYGDALA AMARA.

Rosendahl, H. V., describes and figures the structural characteristics of bitter almond and some of the related nuts or seeds.—Svensk. farm. Tidskr., 1907, v. 11, pp. 3–6.

Rosenthaler, L., discusses the chemistry of amygdalin and its supposed relation to maltose. He concludes that the decomposition of amygdalin does not yield maltose and that, therefore, it is not a maltosid.—Arch. d. Pharm., 1907, v. 245, pp. 684–685.

Philipp Röder (Jahresbericht, Wien, 1907, p. 26) reports examining 18 samples of bitter almond water which varied in total hydrocyanic acid content from 1.058 to 1.215 and free hydrocyanic acid content from 0.135 to 0.904; the relation varying from 1.23 to 8.05 per cent.

AMYLIS NITRIS.

Dohme and Englehardt point out that the Ph. Ndl. IV applies Dietze's method for the estimation of amyl nitrite with very good results, it is short in manipulation and does away with the use of the nitrometer.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 378.

A communication to the editor calls attention to the extremely volatile character of concentrated amyl nitrite and the need for care in handling sealed tubes or vials containing it.—Chem. & Drug. Australas, 1907, v. 22, p. 181.

Lisin, F., discusses the uses of amyl nitrite as a vaso dilator and reviews some of the literature relating to it.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, pp. 484-486.

Crace-Calvert, George A., states that he has used amyl nitrite for hemoptysis, and considers it the best drug we have for this condition.—*Lancet*, Lond., 1907, v. 172, p. 939.

Additional references on the use of amyl nitrite will be found in the *Index Medicus* and the *J. Am. M. Ass.*

AMYLUM.

Nelson, Burt E., describes and figures several starches and gives some of their characteristic properties.—*Merck's Report*, N. Y., 1907, v. 16, p. 192.

Kraemer, Henry, discusses and illustrates the structure of the starch grains and the possibility of readily distinguishing the various starches by their structure and their behavior with different reagents and stains; also discusses the action of iodine upon starch and the staining of the starch grain.—*Am. J. Pharm.*, Phila., 1907, v. 79, pp. 217-229, 412-418.

Gastine, G., discusses the use of polarized light for the microscopic examination (detection) of rice and cornstarch in wheat flour.—*Ann. de chim. analyt. Par.*, 1907, v. 12, pp. 85-87.

Marcille, R., apropos of Gastine's work, suggests a method which he claims to be simple, rapid, and sufficient in the majority of cases.—*Répert de pharm. Par.*, 1907, v. 19, p. 195. (See also *Compt. rend. Acad. de sc. Par.*, 1907, v. 144, pp. 35-37.)

Fouard, E. (*C. R. t.*, 144, pp. 501-503, 1366-1368, 1907), presents some researches on the colloidal properties of starch.—*Physikal. Chem.*, *Centralbl.*, 1907, v. 4, pp. 336-337, 547-549.

Ermen, W. F. A., records the examination of a number of starches for the purpose of determining the comparative viscosity of the resulting paste.—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, pp. 501-504.

Maquenne and Roux (*Ann. d. Chim. et de Phys.*, 8, sér. t. 8, pp. 179-221, 1906) present some researches on the diastasic saccharification of starch.—*Physikal. Chem. Centralbl.*, 1907, v. 4, pp. 79-81.

Gilmour, J. P., reports 4 out of 24 samples not up to *Ph. Brit.* requirements; potato starch present.—*Year Book of Pharmacy*, Lond., 1907, pp. 446-455.

Patch, E. L., points out that it is stated that no genuine Bermuda arrowroot has been offered for sale for some time; that none is being produced in Bermuda. A product is sold at 85 cents per pound that has been pronounced to be St. Vincent arrowroot manipulated to have the soft appearance natural to the genuine.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 323.

Dawson, Edward S., prefers the old method of preparing glycerite of starch. The resulting preparation, he asserts, is smooth and in proper condition to have dry powders incorporated with it.—Proc. New York Pharm. Ass., 1907, p. 226.

Additional references on the structure, composition, and properties of starch will be found in the Experiment Station Record and in Chemical Abstracts.

ANISUM.

Nelson, Burt E., describes and figures the structural characteristics of powdered anise.—Merck's Report, N. Y., 1907, v. 16, p. 38.

Philipp Röder (Jahresbericht, Wien, 1907, p. 71) found that one sample of anisum contained 15.12 per cent of ash. Two additional samples were well within the 10 per cent limit, being 5.74 and 5.81, respectively.

Blome, Walter H. (com. on adulterations), reports on a sample of anise which contained a small quantity of coriander, probably due to accidental contamination.—Proc. Michigan Pharm. Ass., 1907, p. 67.

STAR ANISE.

Perrot, E., says that after all that has been written on the subject one would think that the addition of Japanese star anise to the Chinese had disappeared, but it has not at all.—Bull. d. sc. pharmacol. Par., 1907, v. 14, p. 349.

Hartwich, C., reviews the literature concerning the characters of distinction of the fruits of the different species of *Illicium*. He concludes his paper with a brief résumé of the different fruits heretofore described grouped according to the number of carpels. The paper is accompanied by two tables, illustrating the distinguishing characters in shape and size of the carpels of the different fruits.—Schweiz. Wshnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, pp. 798–809.

ANTIMONII ET POTASSII TARTRAS.

Lyons, A. B., asserts that the test for arsenic in tartar emetic has been made extraordinarily liberal, permitting the presence of nearly 0.1 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 64.

Hankey, W. T., states that all samples examined for fifteen years have had traces of arsenic.—*Ibid.*, v. 55, p. 331.

Blome, Walter H., (com. on adulterations) reports tartar emetic containing a trace of arsenic. Two out of 8 samples contained sulphate.—Proc. Michigan Pharm. Ass., 1907, p. 71.

Rosenberger, A. S., points out that tartar emet. is indicated in lassitude, with great sensitiveness to cold, chilliness.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 419.

He points out that Dr. J. F. Gray, of New York, was of the opinion that "tar. emetic" was the proper remedy for the first stage of influenza; for the second or bronchial stage, phos. bry., ac., and hyos. are indicated.—*Ibid.*, 1907, 63d session, p. 418.

NONOFFICIAL COMPOUNDS.

Gausby, R. A., asserts that the market affords a good quality of antimony sulphide, but that the so-called black antimony sold as horse medicine contains no antimony whatever. It consists largely of coal dust containing about 5 per cent of iron filings.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 79.

Barnard, H. E., reports that 5 samples of black antimony examined were all found to be adulterated, being nothing but powdered charcoal.—*Rep. Indiana Bd. Health*, 1907, p. 197.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 6) find black antimony with a purity of from 95 to 98 per cent.

ANTIPYRINE.

Schweitzer, Hugo, outlines the history of the discovery of antipyrine by Knorr in 1883. He points out that the discovery of antipyrine was directly due to a mistaken idea of the composition of quinine and that a knowledge of the true composition of the latter would probably have prevented the experiments which led to the discovery of the former.—*D.-A. Apoth.-Ztg.*, N. Y., 1907-8, v. 28, p. 25.

Steensma, F. A., outlines a new reaction for antipyrine which yields a red residue on the evaporation of a trace of antipyrine with several cc. of a solution of 1 gm. of p-dimethylamidobenzaldehyde and 5 cc. of 25 per cent hydrochloric acid in sufficient absolute alcohol to make 100 cc.—*Pharm. Weekbl.*, 1907, v. 44, pp. 1066, 1067.

Riedel's *Berichte* (Berlin, 1907, pp. 67-69) discusses the use of picric acid as a precipitant for antipyrine and the determination of the crystalline structure and the melting point of the resulting compound as a test for antipyrine.

Ceroni, G., reports finding a new pharmaceutical incompatibility in a prescription calling for antipyrine, 0.3, and phenacetin and acetanilid each 0.2, to be dispensed in powders.—*Boll. chim. farm.*, 1907, v. 46, pp. 794-795.

Gilmour, J. P., examined 20 samples of phenazone, all of which were of Ph. Brit. standard, but several had an offensive animal odor.—*Year Book of Pharmacy*, Lond., 1907, pp. 446-455.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 37) found a sample which melted indefinitely between 80 and 100° C. to be a mixture of phenazone and phenacetin. They frequently find that the melting point of phenazone obtained from makers of repute

is below that given in the Ph. Brit. (i. e., 113° C.). For example, several lots examined recently melted definitely at 110.5 and 111° C.

An unsigned article reviews the untoward side effects produced by antipyrine and some of its derivatives.—Suedd. Apoth. Ztg., 1907, v. 47, p. 171.

A number of references on the use of antipyrine will be found in the *Index Medicus* and the *J. Am. M. Ass.*

APOCYNUM.

Henkel, Alice, describes and figures *Apocynum cannabinum* L., commonly called black Indian hemp, Canadian hemp, American hemp, amyroot, bowman's root, bitter root, Indian physic, rheumatism weed, milkweed, wild cotton, and Choctaw root.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 55–56.

Farwell, O. A., asserts that there is little of the *Apocynum androsaemifolium*, Lin., offered upon the markets of this country, *Apocynum cannabinum* being usually supplied.—Merck's Report, N. Y., 1907, v. 16, p. 220.

Schneider, Albert, points out that both *Apocynum androsaemifolium*, var. *pumilum*, and *Apocynum cannabinum* L., are native of California, and that the latter is a common plant of which the bark fiber is much used by the Indians in weaving all manner of cordage and cloth fabrics.—Pacific Pharm., San Francisco, 1907–8, v. 1, p. 303.

Gane, E. H., points out that the percentage of alcohol in fluid extract of apocynum varies with the method of determination and the amount of water and extractive contained in the drug. He presents some figures illustrating this point.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 318.

Lehr, W. T., contributes a paper on apocynum, which is discussed among others by Watkins who is accustomed to commence with 5 drops and if it does not produce nausea or dizziness increases gradually to 30 drops. He has had 2 cases in which after the dropsy had been relieved by apocynum the patient dropped dead. He has often wondered whether this sudden death was due to the remedy or to the removal of the water.—Eclectic M. J., Cincin., 1907, v. 67, pp. 479–482.

APOMORPHINÆ HYDROCHLORIDUM.

Ach and Steinbock report some experimental work and discuss the occurrence of an intermediary product in the formation of apomorphine.—Ber. d. deutsch. chem. Gesellsch., Berl., 1907, v. 40, III, pp. 4281–4285.

Pschorr, Robert, discusses the constitution of apomorphine, particularly its influence on our knowledge of the composition of morphine.—*Ibid.*, v. 40, pp. 1984–1995.

Pschorr and Spangenberg discuss the chemistry of apomorphine and some of its derivatives and decomposition products.—*Ibid.*, v. 40, pp. 1995–2003.

Pégurier, G. M. (*Répert. de Pharm.*), discusses the causes for the rapid decomposition of solutions of apomorphine, and outlines a method which he asserts will yield a solution that will keep for a considerable length of time.—*Pharm. Ztg. Berl.*, 1907, v. 52, p. 605.

Trautmann, A., asserts that a solution of apomorphine hydrochloride containing 25 per cent of alcohol and 5 per cent of dilute hydrochloric acid will keep for years without change.—*Ibid.*, v. 52, p. 640.

Madsen, H. P., reports a number of experiments to determine the influence of time on solutions of apomorphine hydrochloride. He concludes that even apparently decomposed solutions are still active.—*Ibid.*, v. 52, p. 668.

Wester, D. H., discusses the preservation of apomorphine hydrochloride as directed in the Ph. Helv. IV, and concludes that the protection from moisture is more important than the protection from light.—*Pharm. Weekbl.*, 1907, v. 44, p. 712.

The inspectors of pharmacies assert that owing to lack of care in preserving apomorphine hydrochloride is frequently changed by light and humidity, and is nearly always found to have a green color.—*Ann. de pharm. Louvain*, 1907, v. 13, p. 326.

Shannon, E. R., relates some experiences with apomorphine hydrochloride, as a sedative and antispasmodic.—*Critic and Guide*, New York, 1907, v. 8, March, p. 38.

Rosenwasser, Charles A., discusses the use of apomorphine in acute alcoholism, and makes a plea for its more extensive employment. He presents a bibliography of the literature bearing on the use of apomorphine in alcoholism.—*Med. Rec.*, N. Y., 1907, v. 72, pp. 144–146.

Douglas, C. J., discusses the question of priority in the discovery of the hypnotic action of apomorphine.—*Ibid.*, v. 72, p. 489.

AQUÆ.

Mittelbach, Wm., believes that the use of talcum instead of the calcium phosphate is a great improvement and adds that a general criticism of most of the official waters is that they are unstable products. If they were required to be distilled products much more satisfactory conditions would prevail. Witch-hazel water, a distilled product, keeps very well; so do the stronger rose and orange flower waters.—*Proc. Missouri Pharm. Ass.*, 1907, p. 130.

Cleland is reported as saying that as the aromatic waters are chiefly used for flavoring, they need not, be made by distillation, and he further suggests that the Ph. Brit. might allow their manufacture direct from the oils with potable water.—Pharm. J., Lond., 1907, v. 24, p. 61.

Lenton, Walter H., asserts that the waters produced by distillation are unquestionably superior to those made by triturating the oil with calcium phosphate and shaking with water. Those made by shaking with hot water come next to those prepared by distillation. He believes that it is rather a pity that this method is not given more prominence.—*Ibid.*, v. 25, p. 527.

AQUA.

The Ph. Helv. IV. requires that wherever water or aqua is called for distilled water is to be understood.

"Gnomon" discusses the proposed use of potable water in place of distilled water for many purposes, and points out that the water obtained from various sources necessarily contains varying ingredients and that it would be practically impossible to secure by the use of these waters uniform results in pharmaceutical preparations.—Pharm. J., Lond., 1907, v. 24, p. 82.

Schweikert, H., discusses the use of iron hydroxide for the purification of water and outlines an economic method for the production of a suitable colloidal iron hydroxide without dialysis. Also reports experiments showing the changes in the composition of water.—Arch. d. Pharm., 1907, v. 245, pp. 12-25.

Klut discusses the various constituents of water that contribute to what is referred to as "hardness" and the determination and removal of these substances.—Pharm. Ztg., Berl., 1907, v. 52, pp. 951-952.

Hughes, J. A., outlines a short scheme of water analysis and enumerates the more desirable tests for determining the potability of water.—Chem. & Drug., Lond., 1907, v. 70, pp. 135-136.

Nish, F. W., records a chemical and bacteriological examination of the water supply of San Francisco and presents a number of suggestions on the systematic examination of potable waters.—Pacific Pharm., San Francisco, 1907-8, v. 1, pp. 26-31.

AQUA DESTILLATA.

An editorial discusses the use of distilled water in pharmacy, calls attention to the readiness with which distilled water deteriorates, and questions the advisability of continuing its use in medicaments, particularly in view of the fact that recently sterilized potable water would be less objectionable, more economical and more readily obtained.—D.-A. Apoth.-Ztg., 1907, v. 28, pp. 104-105.

Diner (Apothecary, March, 1907, 186) explains with illustrations his method of keeping distilled water for prescription use.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 826.

Dewey, A. H., describes and figures an apparatus for the production of ammonia free distilled water.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 206.

Sander, Enno, presents some observations on the distilling of water for making aerated water.—*Pacific Pharm.*, San Francisco, 1907-8, v. 1, pp. 295-297.

Gilmour, J. P., points out that unless the pharmacist prepares his own distilled water there is, great, if not insuperable, difficulty in procuring it pure. In nine cases out of ten the sample has an odor, yields a residue which is quite visible, and often exceeds the U. S. P. limit of 0.075 gm. per 1,000 cc. and fails to give clear solutions with soluble silver salts. To insure effective preservation of distilled water it would be necessary after the prescribed rinsing to fill the vessel with sterilized air, and also to supply this whenever water is withdrawn from the vessel.—*Pharm. J.*, Lond., 1907, v. 25, p. 110.

Baird, J. W., (com. on adulterations) reports on 5 samples, 2 genuine, 3 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 39.

Marcus (Hydrotherapeut. Inst., Berlin, *Berl. klin. Wochschr.* 44, pp. 390-392, 1907) reports the results of comparative investigations on the action of drinking distilled water in a case of chronic nephritis.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 1734.

AQUA AMMONIÆ.

Mitchell, Edward, asserts that for stronger ammonia water the present pharmacopœia calls for 28°, whereas 26°, which they label "technical," was formerly U. S. P.—*Proc. Arkansas Pharm. Ass.*, 1907, p. 90.

Mittelbach, Wm., asserts that the necessity of having two strengths of ammonia water is not apparent. The stronger water of ammonia can readily be reduced; or, better still, a 20 per cent water might be adopted to replace both of the present ones.—*Proc. Missouri Pharm. Ass.*, 1907, p. 130.

Blackman, Philip (*E. London Coll. Chem. News*, 95, 133-134), believes that the percentage of ammonia existing as ammonium hydroxide in aqueous solution can be obtained by dividing the molecular conductivity of the solution by a quantity which is practically the sum of the conductivities of the ammonium and hydroxyl ions.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 1512.

Cripps, R. A., reports that one sample of aqua ammonia deteriorated from 10.27 per cent on March 2, 1904, to 9.74 per cent on February 23, 1907. The second sample, during the same period,

decreased from 10.27 per cent to 9.62 per cent.—Pharm. J., Lond., 1907, v. 24, p. 519.

Bachman, Gustav, (com. on adulterations) reports stronger ammonia water, ranging from 27.2 per cent to 22.1 per cent, instead of 28 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Kline and Graham assert that much of the ammonia water on the market gives off a strong empyreumatic odor when neutralized with sulphuric acid. They think every lot should be tested.—Proc. Pennsylvania Pharm. Ass., 1907, p. 82.

Brown, Geo. S., reports examining 10 samples of aqua ammonia which were found to vary from 4.6 to 19.8 per cent of NH_3 .—Proc. Louisiana Pharm. Ass., 1907, p. 80.

Barnard, H. E., reports that of the 12 samples of aqua ammonia examined 9 were below strength.—Rep. Indiana Bd. Health, 1907, p. 198.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 6) assert that some commercial samples contain heavy tarry contaminations. They recently examined one and found it to give a very pronounced odor of naphthaline when neutralized with sulphuric acid.

Philipp Röder (Jahresbericht, Wien, 1907, p. 23) reports that 2 out of 5 samples of aqua ammonia examined contained empyreumatic matter.

Mathews, A. P., presents a study on the cause of the pharmacological action of ammonium salts, and concludes that the action of ammonium hydrate is to be ascribed probably, as is the chemical action, to the NH_3 formed by dissociation of the hydrate, and probably to the NH_3 in nascent state when the valencies of the nitrogen are open.—Am. J. Physiol., Bost., 1907, v. 18, pp. 58–63.

AQUA AMYGDALÆ AMARÆ.

Rosenthaler, L., discusses the production of distilled oil of bitter almonds, reports a number of experiments, and points out that the necessary emulsion is readily destroyed by heat.—D.-A. Apoth.-Ztg., N. Y., 1907, v. 28, p. 72.

Bridel, M., discusses the several pharmacopœial methods for distilling "aqua lauro cerasi" and outlines a method for determining the hydrocyanic acid content.—Bull. Soc. de Pharm. de Bordeaux, 1907, v. 47, pp. 254–256.

AQUA AURANTII FLORUM.

Philipp Röder (Jahresbericht, Wien, 1907, p. 27) reports that one commercial sample of orange flower water contained a considerable amount of heavy metals.

Mittelbach, Wm., believes that two strengths of orange flower and of rose water seem unnecessary, especially so since the diluted waters are very unstable.—Proc. Missouri Pharm. Ass., 1907, p. 130.

AQUA HYDROGENII DIOXIDI.

Fischer, August, reviews the discovery and introduction of solution of hydrogen dioxide and the various methods that have been suggested for its production. He also discusses the quantitative estimation of available oxygen, the readiness with which hydrogen dioxide is decomposed, and the substances that cause decomposition without themselves being attacked or changed.—Pharm. Zentralh., 1907, v. 48, pp. 57–65, 79–84.

Thomann, Julius, reviews Fischer's work on the quantitative estimation of hydrogen dioxide and the variability of this product due to many causes.—Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 145.

Francis, John M., discusses the need for using acetanilide as a preservative for hydrogen dioxide, describes the functions of acetanilide and gives the results of assay that tell the story. Samples of peroxide of hydrogen not preserved lost from 29 per cent to 100 per cent of the contained oxygen, while samples preserved with acetanilide lost from 4 per cent to 11 per cent.—Bull. Pharm., 1907, v. 21, pp. 285–287.

Murray, B. L., discusses the U. S. P. tests for hydrogen peroxide, and points out the unreliability of phenolphthalein as an indicator in connection with this article.—Merck's Report, N. Y., 1907, v. 16, p. 63–64.

Vanderkleed, Charles E., points out that the acidity of commercial samples of hydrogen peroxide solutions is liable to be above the limit of the U. S. P. Asserts that there is no objection to acetanilide, used as a preservative, as the amount used is about one-tenth grain per fluid ounce. Isonitrile reaction suggested for testing.—Proc. Pennsylvania Pharm. Ass., 1907, p. 85.

Scoville, W. L., states that hydrogen dioxide runs pretty uniform in strength. Varies more in amount of free acid. Most of it is within U. S. P. limits.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 326.

Rupp and Mielck discuss the determination of superoxide combinations by means of alkaline hypiodite, and outline the application of this method to the determination of the oxygen content of solution of hydrogen dioxide.—Arch. d. Pharm., 1907, v. 245, p. 6.

Claessens (Répertoire 3, 18, 504) asserts that when hydrogen peroxide is mixed with an ammoniacal solution of a copper salt, half its oxygen is quantitatively evolved and water formed. The ammonio-sulphate of copper reagent or a similar solution of a copper salt is

therefore a useful means of determining the value of H_2O_2 solutions.—Year Book of Pharmacy, Lond., 1907, p. 82.

Dehn, William M., describes a gasometric method for the determination of hydrogen peroxide, and figures an apparatus originally devised as a ureometer which he has found to give rapid and accurate results.—J. Am. Chem. Soc., 1907, v. 29, pp. 1314–1319.

Dulière, Walter, discusses the assay of solutions of hydrogen dioxide with sulphuric acid and solution of potassium permanganate.—Ann. de pharm., Louvain, 1907, v. 13, pp. 1–2.

Filippi, Eduardo, discusses the decomposition of hydrogen peroxide in the presence of various substances.—Arch. farmacol. sper. Roma., 1907, v. 6, pp. 363–395.

Rumpel, H., (Farmazeft, v. 14, p. 987) reports examining a number of samples of solution of peroxide of hydrogen and finds that many contain an excess of acid. From his experiments he concludes that at least 12 per cent of the samples examined are unfit for medicinal use.—Chem. Report., Cöthen., 1907, v. 31, p. 198.

Bachman, Gustav, (com. on adulterations) reports hydrogen peroxide ranging from 2.87 per cent to 2.38 per cent, instead of 3 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Philipp Röder (Jahresbericht, Wien, 1907, p. 83) reports an examination of 5 samples of hydrogen dioxide which contained from 2.71 to 3.10 per cent, and from 9.03 to 10.33 volume per cent.

Gilmour, J. P., reports that 106 out of 120 samples were below Ph. Brit. requirements. It seems certain that average commercial samples, unless recent, never contain 10 volumes of oxygen. It would be better to follow the precedent set in the case of Spt. *Ætheris Nitrosi*, and allow a margin for deterioration or prepare a stronger liquid.—Year Book of Pharmacy, Lond., 1907, pp. 446–455.

The inspectors of pharmacies assert that samples of solution of hydrogen dioxide were found to be devoid of even traces of active oxygen.—Ann. de pharm., Louvain, 1907, v. 13, p. 326.

Evans, C. A. Lovatt, reports some observations on the catalytic decomposition of hydrogen peroxide by the catalase of the blood. He reviews the theories that have been advanced from time to time, describes his methods, discusses the influence of varying concentrations of hydrogen peroxide, the influence of varying concentrations of enzymes, and concludes that no single law expresses the relation between the concentration and activity of the enzyme solution.—Biochem. J., Liverpool, 1907, v. 2, pp. 133–155.

Peters (München. med. Wchnschr., v. 54, No. 9) recommends the addition of hydrogen peroxide to the sputum as a means of breaking up the masses of sputum and distributing the tubercle bacilli evenly through the mass.—J. Am. M. Ass., 1907, v. 48, p. 1556.

Andresen, Viggo (Deutsch. Monatschr. f. Zahnhlkd.), states that a few drops of 30 per cent hydrogen dioxide (perhydrol) of Merck acts almost instantaneously in anesthetizing the dentin. It is to be preferred to nitrate of silver, since it bleaches instead of staining.—Dental Cosmos, Phila., 1907, v. 49, p. 97.

ARGENTI NITRAS.

Richards and Forbes discuss the quantitative synthesis of silver nitrate and the atomic weights of nitrogen and silver.—J. Am. Chem. Soc., 1907, v. 29, pp. 808–826.

Lemâire, P., has found such variation in crayons of nitrate of silver that he recommends that they be made more uniform and suggests a method of assaying them.—Répert. de pharm., Par., 1907, v. 19, pp. 241–246.

Caspari, Chas. E. (com. on adulterations), examined 12 samples, 11 satisfactory; one contained lead.—Proc. Missouri Pharm. Ass., 1907, p. 142.

D. Aertze-Ztg., 1907, No. 18, contains the following formula for a solution the application of which is said to remove the stains of silver nitrate from the skin very quickly: Mercuric chloride, ammonium chloride, aa, 10.0; distilled water, 80.0.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 302.

De Schweinitz, G. E., in discussing the treatment of gonococcic conjunctivitis, with special reference to the silver salts, concludes that neither protargol nor argyrol is a safe remedy when used by itself and that there is no better remedy than properly applied solution of nitrate of silver, which, however, may do harm unless it is applied by a skilled hand.—Therap. Gaz., Detroit, 1907, v. 31, pp. 4–10.

Kelly, John Muir, presents a critical study of organic preparations of silver in the treatment of conjunctivitis.—Brit. M. J., 1907, v. 2, pp. 1475–1480.

Black, G. V., (Dent. Rev.) thinks silver nitrate should be employed with great care, particularly in very deep cavities where there is danger of irritation of the pulp.—Dental Cosmos, Phila., 1907, v. 49, p. 417.

Holinger, Otto, (Dent. Rev.) when using a strong solution of silver nitrate, flushes the mouth with a solution of common salt, say 50 per cent.—*Ibid.*, v. 49, p. 417.

Bryan, L. C., presented a paper on silver nitrate and preventive dentistry.—Abstr. *Ibid.*, v. 49, pp. 1090–1092.

Adams, E. O., recommends the use of "Argentum nitricum" in the chronic form of stomach and duodenal diseases.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 369.

Additional references on the use of silver salts will be found in the Index Medicus and the J. Am. M. Ass.

ARNICA.

Schneider, Albert, points out that *Arnica montana* L. is a well-known plant in California and one that could be cultivated.—Pacific Pharm., San Francisco, 1907–8, v. 1, p. 305.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 20) call attention to the variation in quality of arnica flowers.

Perrot, E., says that *Arnica montana* is frequently adulterated with the flowers of a related composita, which he has not determined but which is known in commerce as “false arnica.”—Bull. d. sc. pharmacol. Par., 1907, v. 14, p. 349.

Barnard, H. E., reports that all of the 17 samples of tincture of arnica that were analyzed proved to be in accordance with the Pharmacopœia requirements, none of them containing wood alcohol.—Rep. Indiana Bd. Health, 1907, p. 189.

New York State board of health, eastern branch, examined 230 samples; 14 were found to be deficient.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 323.

Sayre, L. E., reports on a sample of tincture of arnica which left, on evaporation, a residue of 1.0649 gms.; from 25 cc. of the tincture the corresponding amount of pure tincture left, on evaporation, a residue of 0.5106.—Bull. Kansas Bd. Health, 1907, p. 109.

Blome, Walter H. (com. on adulterations), reports examinations of tincture of arnica: All samples were free from methyl alcohol.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Fornias, Eduardo, asserts that arnica has a well-merited reputation for orchitis from contusion, or similar injuries, especially when the testicle becomes swollen, purple-red, feels as if bruised, and the cord is prominent and painful. It has also been recommended for the attending induration.—Hahnemann. Month., Phila., 1907, v. 42, p. 585.

ARSENI TRIOXIDUM.

Consul W. H. Hunt, of St. Etienne, reviews the world's supply of arsenic and points out that Germany leads in production and America in consumption, the United States consuming more than one-half of the world's production of metallic arsenic, white arsenic (arsenious acid), orpiment, and red sulphate of arsenic.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, September 30, p. 47.

A news note presents some figures on the consumption of arsenic and points out that the United States annually wastes thousands of tons of arsenic in fumes. The production of arsenic in the United States during the year 1906 amounted to 737 tons and the imports to 3,987 tons.—*Ibid.*, v. 72, December 2, p. 55.

Bachman, Gustav (com. on adulterations), reports arsenic trioxide ranging from 98.6 per cent to 95.48 per cent instead of 98 per cent, as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Philipp Röder (Jahresbericht, Wien, 1907, p. 15) reports examining two samples of arsenic trioxide containing 98.7 and 99.6 per cent of As_2O_3 . One sample did not dissolve readily in ammonia.

An editorial calls attention to two fatalities resulting from the use of Fowler's solution with strychnine solution, the alkali causing the precipitation of the strychnine. To avoid this accident the acid solution of arsenic should be employed.—*Lancet*, Lond., 1907, v. 173, p. 1173.

Auget, V. (*Compt. rend.*, 142, 1906, 1151), describes a number of new methods for the preparation of certain derivatives, such as methylarsine iodide, cacodyl chloride, cacodyl, and tetra-methylarsonium iodide.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 858.

Hausmann, W., discusses the habituation of the organism to arsenic, reviews the literature relating thereto, and records some animal experimentations.—*Ergeb. d. Physiol.*, 1907, v. 6, pp. 83–84.

Lichty, John A., states that when arsenic could not be taken by the mouth its hypodermic injection did little good in the treatment of pernicious anemia. When the gastrointestinal symptoms could not be controlled arsenic was useless or harmful.—*J. Am. M. Ass.*, 1907, v. 48, p. 2179.

Adams, E. O., recommends arsenicum as a remedy where symptoms of gastric irritability are pronounced. Stomach apt to have been injured by cold food or drink, beer or tobacco.—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 369.

Stewart, W. R., points out that "arsenicum iodide" is applicable to the case that has general tubercular adenitis or if the abdominal glands alone are the point of invasion, there is emaciation, malnutrition, offensive diarrhœa, and great prostration.—*Ibid.*, 63d session, p. 494.

Additional references on the use of arsenic compounds will be found in the *Index Medicus* and the *J. Am. M. Ass.*

ASAFETIDA.

Rusby, H. H., points out that despite previous protests regarding the high requirements for asafetida during the past year, but one lot was received at the port of New York below standard.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 332.

Mitchell, Edward, points out that asafetida from present choice stock shows from 35 to 64 per cent of soluble matter and from 17 to 43 per cent of ash. He asserts that the percentage of soluble matter, which he considers to be the essential feature, is much easier to meet than the U. S. P. requirement as to the amount of ash, which he believes to be nonessential.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 307.

Moore, R. W., examined 142 samples. Minimum amount soluble

in alcohol, 9.35 per cent, maximum, 65.15 per cent; 15 only were 50 per cent. Some of the impurities were mixtures of gypsum and resins of asafetida.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 323.

Kline and Graham find the gum asafetida on the market to contain ash varying from 7 to 30 per cent, but at the same time averaging not less than 50 per cent soluble in alcohol. The same material after drying and powdering tests 25 per cent soluble in alcohol.—Proc. Pennsylvania Pharm. Ass., 1907, p. 82.

Dohme and Englehardt report the assay of a sample of asafetida yielding 60 per cent of ash and 8 per cent of alcohol soluble matter.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 378.

Gausby, R. A., asserts that asafetida can not be procured of U. S. P. quality except in a small way, in selected tears, at a fancy price.—Proc. Pennsylvania Pharm. Ass., 1907, p. 74.

Gane, E. H., reports 47 samples examined. Eleven ranged from 47.1 per cent to 78.1 per cent alcohol soluble extract, with an ash content varying from 3.1 per cent to 38.6 per cent. The remaining 36 samples gave alcohol soluble extract of 23 per cent to 70 per cent, and an ash content of 11.7 per cent to 59.8 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 323.

Hankey, William T., asserts that asafetida U. S. P. before powdering will not meet requirements after powdering, as the drug has to be subject to a long period of drying with consequent loss of the volatile constituents and it is also necessary to add an inert material (usually magnesia) in order that it may stay in the powdered form. This naturally increases the ash above requirements and the continued drying reduces the alcohol soluble matter.—Proc. Pennsylvania Pharm. Ass., 1907, p. 71.

Patch, E. L., examined 7 samples ranging from 25 per cent to 38.6 per cent alcohol soluble extract.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 323.

Caspari, Chas. E. (com. on adulterations), examined 14 samples, none U. S. P. They varied from 16 to 39 per cent ash on ignition and were soluble in alcohol to the extent of from 10 to 65 per cent.—Proc. Missouri Pharm. Ass., 1907, p. 147.

Judd, Albert F., reports ash determinations on 10 samples of asafetida, the percentage of ash varying from 13.7 to 76.6 per cent, only one of the samples being below the 15 per cent of ash permitted by the U. S. P. VIII.—Proc. Pennsylvania Pharm. Ass., 1907, p. 259.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 7) report 4 specimens of powdered asafetida, from outside sources (labeled "Commercial") which contained large proportions of mineral matter, from 42 to 71 per cent of ash being found.

Philipp Röder (Jahresbericht, Wien, 1907, p. 77) reports on 4 samples of asafetida, only one of which exceeded the Ph. Austr. VIII

limitation for ash. This sample, however, was abnormally high, containing 24.38 per cent.

The inspectors of pharmacies report that powdered asafetida is always of inferior quality and generally yields from 30 to 40 per cent, some samples even as much as 75 per cent of ash in place of 10 per cent permitted by the pharmacopœia.—Ann. de pharm., Louvain, 1907, v. 13, p. 275.

Hellström, Arthur (Farmaceutiskt-Notisblad, 1907, pp. 175–183), reports on 30 samples of asafetida, only one of which corresponded to the general pharmacopœial requirement of 10 per cent of ash. He believes this requirement to be too stringent and proposes 20 to 25 per cent as the limit for an acceptable drug. He found asafetida having an ash content of from 4 to 39 per cent, and at least 50 per cent soluble in alcohol to have an acid number of from 20 to 40, saponification number from 98 to 112, and an ester number from 67 to 80.—Apoth. Ztg. Berl., 1907, v. 22, p. 864.

Bloyer believes this to be a good drug greatly neglected and well worthy of careful study; he gives some indications for its use.—Eclectic M. J. Cincin., 1907, v. 67, pp. 310–312.

Adams, E. O., suggests the use of asafetida in cases of functional indigestion accompanied by sensations, pulsations, and feeling of reversed peristalsis in stomach.—Tr. Am. Inst., Homœop., 1907, v. 63rd session, p. 368.

ASPIDIUM.

Henkel, Alice, describes and figures *Aspidium filix-mas* Sw. and *Aspidium marginale* Sw., commonly known as male shield fern, sweet brake, knotty brake, basket fern, and evergreen wood fern. Found in rocky woods, the male shield fern ranging from Canada westward to the Rocky Mountains and Arizona.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1907, No. 107, pp. 11–12.

Schneider, Albert, points out that *Aspidium filix-mas* does not do well in cultivation.—Pacific Pharm., San Francisco, 1907–1908, v. 1, p. 363.

Strong, M. A., (Rhodora 9:27, 28, 25 F. 1907) presents further information regarding the occurrence of *Dryopteris filix-mas* in Vermont.—Bull. Torey Bot. Club, Chicago, 1907, v. 34, p. 219.

Kræmer, Henry, describes and compares the rhizomes of *Aspidium marginale* and *Osmunda claytoniana*.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 345–351.

Capelle, G., discusses the characteristics of *Aspidium filix-mas* and of related species and their differentiation.—Apoth. Ztg. Berl., 1907, v. 22, p. 433.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 88) discuss their proposed method for assaying extracts of aspidium for their filicin content and outline the process.

Blome, Walter H., (com. on adulterations) points out that very little male fern that is green, as it ought to be, is seen in the shops.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Gonnermann, M., discusses the decomposition of the active ingredients of aspidium by means of animal ferments. He reports experiments with Aspidin and Filmaron and concludes that these two substances are not markedly affected by either pepsin, pancreatin, or trypsin.—Apoth. Ztg., Berl., 1907, v. 22, pp. 670–671.

Ashford and King studied the effects of various anthelmintics comparing the number of uncinariæ expelled per dose of each agent. The ethereal extract and later a solid extract of aspidium were tried but proved of very little efficiency, which they were unable to explain, unless deterioration had occurred in the tropical climate.—J. Am. M. Ass., 1907, v. 49, pp. 471–476.

ATROPINA.

Riedel's Berichte (Berlin, 1907, p. 66) points out that atropine does not readily precipitate with picric acid. With some care in the manipulation a satisfactory precipitate can be obtained that has a uniform melting point of 176°.

Warren and Weiss describe and figure atropine picrolonate and discuss the use of picrolonic acid as a reagent for atropine.—Journ. Biol. Chem., N. Y., 1907, v. 3, p. 336.

Schmidt, Ernst, discusses the chemistry of atropine and its behavior with the halogen acids.—Pharm. Post, Wien, 1907, v. 40, pp. 771–772.

Troxell, H. L., (com. on adulterations) examined two samples, labeled atropine sulphate, which proved to be hyoscyamine sulphate, indicated by melting point, optical activity, and melting point of the gold salt.—Proc. Maryland Pharm. Ass., 1907, p. 86.

Hausmann, W., reviews some of the available literature relating to the habituation of the organism to atropine.—Ergeb. d. Physiol., 1907, v. 6, p. 99.

Guyot, M. R., reports a case of intoxication by a collyrium containing atropine and records finding traces of the alkaloid in the urine.—Bull. Soc. de pharm. de Bordeaux, 1907, v. 47, pp. 205–210.

Gratiot, H. B., (Iowa M. J., Des Moines, Nov.) discusses the comparative value of atropine and homatropine cycloplegia. He considers atropine the best cycloplegic, having many advantages over any other.—J. Am. M. Ass., 1907, v. 49, p. 2122.

Buchanan, Drysdale T., discusses the treatment of shock, and asserts that when the patient is perspiring profusely he gives by "hyperdermiclyses" 1/200 grain of atropine, which almost instantly checks the sweating.—Tr. Am. Inst., Homoeop., 1907, v. 63rd session, p. 618.

Additional references on the pharmacology and the use of atropine will be found in the Index Medicus and the J. Am. M. Ass.

AURANTII AMARI CORTEX.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of bitter orange peel as 63, 64, 55, 55, and 80 per cent, respectively.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 319.

AURI ET SODII CHLORIDUM.

White, Edmund, describes gold chloride, gives tests to determine the percentage of gold present and the possible contamination, also calls attention to the fact that sodium aurochloride containing 49.5 per cent of metallic gold is sometimes sold as gold chloride.—*Pharm. J. Lond.*, 1907, v. 25, p. 815.

BALSAMUM PERUVIANUM.

An unsigned news note points out that much of the balsam of Peru which is coming in at present via Hamburg or New York is practically innocent of natural Peru balsam, being composed chiefly of synthetic cinnamein, which, however, has often added to it exhausted tolu.—*Chem. & Drug., Lond.*, 1907, v. 70, p. 227.

Cæsar and Loretz (*Geschäfts, Ber.*, 1907, p. 11), discuss the economic conditions prevailing in connection with balsam of Peru and point out that the nitric-acid test is almost indispensable for demonstrating the identity and purity of this drug. (See also *Pharm. Ztg., Berl.*, 1907, v. 52, p. 778.)

Evers, T., does not agree with the criticisms that have been offered by Cæsar and Loretz on so-called synthetic balsam of Peru and asserts that true natural balsam of Peru is not common and that much of the material that is obtainable is adulterated or at best manipulated to make it conform with the requirements of the pharmacopœia.—*Ibid.*, v. 52, pp. 828–829.

Cæsar and Loretz reply to Evers and reassert that the so-called synthetic balsam of Peru does not comply with the requirements of the pharmacopœia and that while it may be equally valuable from a therapeutic point of view its usefulness has not been established as yet.—*Ibid.*, v. 52, p. 860.

Krüer, Hero, discusses the controversy regarding natural and synthetic balsam of Peru and points out that a pharmacist is not justified in supplying anything but the article intended by the prescriber.—*Ibid.*, v. 52, p. 880.

Delphin, T., criticises the methods for testing balsam of Peru that have been proposed by Dieterich, Gehe & Co., Thoms, and others,

compares the results obtained by these several methods and outlines a modified process that he believes will give more satisfactory results.—*Svensk. farm. Tidskr.*, 1907, v. 11, pp. 421–423, 441–447, 468.

Frerichs, G., suggests that balsam of Peru should indicate a saponification number of 225, and should contain at least 56 per cent of cinnamein (benzoic acid benzyl ester and cinnamic acid benzyl ester). The saponification number of the cinnamein should be at least 238.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 13.

Cæsar and Loretz (*Geschäfts Ber.*, 1907, p. 77) discuss the properties of and the several tests for balsam of Peru. They give the following specific gravities required by various pharmacopœias: Ph. Germ., 1.140–1.150; Ph. Belg., 1.137–1.15; Ph. Ndl., 1.14–1.145; Ph. Japon., 1.135–1.15; Ph. Austr., 1.14–1.16; Ph. Helv., 1.135–1.15; Ph. Suec., 1.135–1.15; U. S. P., 1.14–1.15.

Gausby, R. A., reports seven lots examined. One sample assayed only 50 per cent cinnamein. Another proved to be an entirely spurious product containing very little or no genuine balsam.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 76.

Patch, E. L., asserts that the calcium hydroxide test is ambiguous and of questionable value. No two operators would guess alike as to the volume relations. He believes it should be adjusted by weight if used at all. The action of calcium hydroxide depends upon the proportion of acid and neutral resins present. Exposure to water bath would depend upon the style of vessel and temperature. Usually adding calcium hydroxide, the mixture stiffens without heating and rapidly becomes harder.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 323.

Hankey, W. T., examined 5 samples ranging in cinnamein from 42.9 per cent to 50.5 per cent. Acid number 66.3 to 75.3.—*Ibid.*, v. 55, p. 323.

Gane, E. H., says that artificial balsam is now extensively used in place of the natural article, which is scarce. The artificial has a nice appearance, and tests 64 per cent to 65 per cent cinnamein.—*Ibid.*, v. 55, p. 323.

Graham, Willard, reports on a lot of balsam of Peru which was rejected, as it contained an excess of acid resins and gave a test for rosin when tested by the U. S. P. VIII methods.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 236.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 37) report a Peru balsam substitute which was labeled "Answers U. S. P. tests," and was found, upon the whole, to do so. The cinnamein test showed the presence of 57 per cent and most of the color and solubility tests were normal. On the other hand, nitric acid gave a permanent blue color with the petroleum ether residue and the presence of colophony was indicated by copper acetate. This was also

observed in a sample (obtained from a German source) which was represented as natural.

Philipp Röder (Jahresbericht, Wien, 1907, p. 30) reports that of five samples of balsam of Peru examined one contained too low an amount of cinnamein.

Perrot, E., notes a sample which did not approach a product of *Myroxylon peruiferum*; it was a mixture resulting from heating castor oil with benzoin.—Bull. d. sc. pharmacol. Par., 1907, v. 14, p. 350.

The inspectors of pharmacies point out that because of the comparatively high price this drug is frequently adulterated with alcohol, storax, gurjun balsam, or turpentine, and that great care is necessary to avoid sophistication.—Ann. de pharm., Louvain, 1907, v. 13, p. 276.

Porter, F. J. W., reports favorable results in the treatment of scabies with balsam of Peru.—Brit. M. J., 1907, v. 1, p. 744.

Hoffman, Lawrence H., cites a case in which nephritis followed the external application of balsam of Peru. Nothing could be found in the history of the case whereby the nephritis could be accounted for except the use of the balsam of Peru.—J. Am. M. Ass., 1907, v. 49, p. 2086.

BALSAMUM TOLUTANUM.

Delphin, T., presents a new method for testing balsam of tolu and outlines methods for determining the cinnamein content and the probable adulterants. He recommends that the ethereal solution of the sample be shaken out with normal alkali. The evaporated ethereal solution yields the cinnamein; the alkaline solution, the resin acids, and aromatic acids. Also asserts that the presence of 2 per cent of colophony may be detected by this method.—Svensk. farm. Tidskr., 1907, v. 11, pp. 33-35, 53-55, 77-82.

Gausby, R. A., reports the examination of a shipment of tolu composed of cans containing large pieces of red brick with enough of the melted balsam poured in to fill the cans and completely cover the bricks.—Proc. Pennsylvania Pharm. Ass., 1907, p. 76.

Perrot, E., says that the addition of foreign substances to this balsam is the result of ignorance on the part of pharmacists as to the real appearance of the pure product. Natural balsam of tolu is a gray mass, fluid, nontranslucent or only in thin layers, sometimes solid, while the commercial product is a beautiful transparent red, more or less dark. The latter is the result of a manipulation accompanied by the addition of resin in which colophane plays an important rôle.—Bull. d. sc. pharmacol. Par., 1907, v. 14, p. 350.

The inspectors of pharmacies assert that balsam of tolu but rarely complies with the requirements of the Pharmacopœia.—Ann. de pharm., Louvain, 1907, v. 13, p. 276.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 46) report the aromatic acids (as benzoic) estimated by saponification in ten samples as follows: Free from 8.28 to 19.0; combined from 12.7 to 21.0.

Gambe, J., discusses in his doctor's thesis (Montpellier) our knowledge of balsam of tolu and the tree which produces it, and in the second part the various processes for the preparation of the syrup; he considers the Codex formula defective and suggests a new process.—Abstr. in Bull. d. sc. pharmacol. Par., 1907, v. 14, p. 181.

Mittelbach, Wm., believes that the readoption of the 1870 formula for syrup of tolu is a very wise step. "We now have some use for the tincture of tolu."—Proc. Missouri Pharm. Ass., 1907, p. 132.

Beringer, George M., points out that the N. F. directions under soluble tincture of tolu yield a preparation that is not identical with the U. S. P. syrup of tolu.—Proc. New Jersey Pharm. Ass., 1907, p. 73.

Caldwell, Paul, says that one ounce of ethereal tincture of tolu contains 100 minims of ether and 76 per cent of alcohol.—Drug Circ., N. Y., 1907, v. 51, p. 205.

BALSAMUM TRAUMATICUM N. F.

Beringer, George M., points out that this appears to be an unnecessary conflict with or useless duplication of the U. S. P. compound tincture of benzoin.—Am. J. Pharm., Phila., 1907, v. 79, p. 362.

BELLADONNÆ FOLIA.

Remington, Joseph P., reports the following changes in strength: Belladonna leaf, *now* 0.3 per cent mydriatic alkaloids. Tincture of belladonna leaf, *now* 0.03 gm. alkaloids in 100 cc.—Am. J. Pharm., Phila., 1907, v. 79, p. 135.

Dohme and Englehardt point out that the standard for this drug has been reduced to 0.3 per cent, which, they think, was not at all necessary, as leaves with 0.45 per cent can easily be obtained.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 378.

Stscherbatscheff, D., outlines the history of the development of belladonna, the fructification, the germination of the seed, and the development of the young plants. He describes the fruit, the seed, and the root, and figures their structural characteristics.—Arch. d. Pharm., 1907, v. 245, pp. 48-53.

Schneider, Albert, points out that *Atropa belladonna* L., thrives well in the United States, where it has been cultivated experimentally and commercially in several places. The experiments are now being continued in California.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 415.

An editorial comments on the efforts that are being made in different parts of the country to cultivate *Atropa belladonna*, and calls

attention to the work done by Kilmer and Rippetoe.—*Am. Druggist*, N. Y., 1907, v. 51, p. 353.

An editorial reports that experiments which have been extending over a period of four years have proven that belladonna thrives well in certain portions of the State. The seed is slow to germinate (four to six weeks) and has a very low germinating power. Chemical tests show that the California plants are very rich in active constituents.—*Pacific Pharm.*, San Francisco, 1907-8, v. 1, p. 97. (See also p. 172.)

Lenton, Walter H., presents some observations on the cultivation of *Atropa belladonna* and asserts that under cultivation belladonna averages $4\frac{1}{2}$ to 5 feet in height, while the bulk of the wild plant is generally considerably shorter.—*Chem. & Drug. Lond.*, 1907, v. 71, p. 355.

Francis, John M., reports finding one sample of belladonna leaves which appeared to be botanically correct, but contained no alkaloid whatever. Another sample assayed only 0.1 per cent. On the other hand, he has recently seen one lot which assayed 0.48 per cent and another 0.57 per cent of alkaloids.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 66.

Rippetoe, J. R., determined the alkaloidal content in the leaf and root from belladonna plants during the first and second year growth in the Shenandoah Valley. The results are considered encouraging to cultivation.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 523.

Troxell, H. L. (com. on adulterations), says that belladonna leaves usually run very high in alkaloids, but numerous samples were found deficient in alkaloidal strength.—*Proc. Maryland Pharm. Ass.*, 1907, p. 86.

An editorial points out that belladonna yields one intensely active alkaloid, which is made by the chemistry of the man who works the belladonna. This substance—atropine—is intensely poisonous and energetic, but its use as yet is confined to local effect, principally for the eye. Chemists accept the statement that the alkaloidal structure in belladonna is a hyoscyamine compound, and not an atropine compound.—*Paint, Oil, and Drug. Rev.*, Chicago, 1907, v. 43, May 8, p. 25.

Cæsar and Loretz (*Geschäfts Ber.*, 1907, pp. 25, 91) have compared the U. S. P. assay method for belladonna with their own and conclude that the U. S. P. method is more complicated and without any evident advantage over the method outlined by them in their "Bericht."

Puckner, W. A., reviews the 1906 literature relating to the estimation of mydriatic alkaloids in belladonna, hyoscyamus, and stramonium.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 306.

Kebler, Lyman F., reports a variation of from 0.356 to 0.242 per cent of alkaloids by the U. S. P. VIII method. By an aliquot part method the same drug gave, gravimetrically, from 0.362 to 0.409 per cent of alkaloids, and volumetrically 0.224 to 0.264 per cent.—Proc. Ass. Off. Agric. Chem. 24th Ann. Conv., p. 84 (Bull. Bur. Chem., U. S. Dept. Agric., 1908, No. 116).

Perrot, E., asserts that the French belladonna, of which the price is 1 fr. 20 per kilo., is replaced by the Italian (?) which costs 0 fr. 70 and which contains but a little of the mydriatic alkaloid.—Bull. d. sc. pharmacol., Par., 1907, v. 14, p. 349.

Peltriset, C. N., discusses the leaves of belladonna, stramonium, and hyoscyamus, characters and microscopic diagnosis. Two plates, nine figures.—*Ibid.*, v. 14, pp. 569–575.

Farwell, O. A., asserts that a sample of what purported to be belladonna leaves yielded negative results upon assay for alkaloids. The close inspection of the estimation of the sample proved it to be leaves of *Phytolacca decandra* Lin., which has long been used as an adulterant of belladonna.—Merck's Report, N. Y., 1907, v. 16, p. 220. (See also Drug. Circ., N. Y., 1907, v. 51, p. 459.)

Vanderkleed, Charles E., reports 18 assays of belladonna leaf, ranging from 0.145 to 0.491 per cent. He points out that the quality is generally very good and that there is no reason for reducing the standard from 0.35 to 0.30.—Proc. Pennsylvania Pharm. Ass., 1907, p. 87.

Blome, Walter H. (com. on adulterations), reports examination of 4 samples of belladonna leaves. Assayed from 0.275 to 0.5397 per cent of mydriatic alkaloids.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Caspari, Chas. E. (com. on adulterations), examined 3 samples, all weak.—Proc. Missouri Pharm. Ass., 1907, p. 147.

Hankey, W. T., examined 10 samples, ranging from 0.230 to 0.516. Average, 0.334.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 323.

Gane, E. H., examined 16 lots, which varied from 0.20 to 0.43 per cent.—*Ibid.*, v. 55, p. 323.

Patch, E. L., examined 7 samples, ranging from 0.273 to 0.38 per cent.—*Ibid.*, v. 55, p. 324.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 9) found a consignment of belladonna leaves, which, although somewhat finely broken, had a bright green color and normal microscopical character, to be practically devoid of alkaloid. Two other lots contained 0.34 and 0.4 per cent and one, of English growth, 0.32 per cent. The alkaloid was extracted from the drug (in 90 powder) by ether and ammonia, and completed by the method given in the Pharmaceutical Journal, 21–5–04, p. 718.

The committee of reference in pharmacy points out that the unstandardized extract of belladonna has been found to vary in alkaloidal strength from 1.5 to 4.5 per cent, and that the extract standardized to 2 per cent of alkaloid might well take the place of both the present Ph. Brit. extracts of belladonna.—Chem. & Drug., Lond., 1907, v. 70, p. 587.

Bührer, C., points out that recently published pharmacopœias require from 1.15 to 2 per cent of alkaloid in extract of belladonna: The Ph. Ndl., 1.15; U. S. P., 1.4; Ph. Belg., and Ph. Helv., 1.5, and the Ph. Austr. 2 per cent. The Ph. Brit. revision commission proposes to require only 1 per cent.—Schweiz. Wehnschr. f. Chem. u. Pharm., Zürich, 1907, v. 45, p. 419.

Greenish, Henry G., also points out the variations now existing.—Pharm. J., Lond., 1907, v. 24, p. 832.

Philipp Röder (Jahresbericht, Wien, 1907, p. 47) points out that the 2 per cent of alkaloid content required by the Ph. Austr. VIII for extract of belladonna is impracticable. He reports examining 7 samples which varied from 1.07 to 1.92 per cent.

Dohme and Englehardt point out that although the standard for belladonna leaves has been cut down to 0.3 per cent, the standard for the extract of the drug remains 1.4 per cent. As belladonna leaves by regular percolation frequently yield 25 per cent of extractive matter, an extract of required strength of these cases could not be obtained from leaves assaying as low as 0.3 per cent of total alkaloids.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 379–380.

Vanderkleed, Charles E., (com. on adulterations) reports the examination of one sample of extract of belladonna leaf which was artificially colored with aniline dye. For testing he suggests observing the color of the acid solution and its power to dye woollen cloth.—Proc. Pennsylvania Pharm. Ass., 1907, p. 85.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 8) report on the examination of 9 lots of belladonna leaf extract which assayed from 0.6 to 2.9 per cent of alkaloid.

Sayre, L. E., reports on a sample of tincture of belladonna which assayed 0.02583 gms. of alkaloid in 100 cc.—Bull. Kansas Bd. Health, 1907, p. 108.

Neil, D. R., discusses the physiological action and therapeutics of belladonna and of the belladonna alkaloids.—Merck's Arch., N. Y., 1907, v. 9, pp. 174–178.

The editor of the "Therapeutical Notes" states that belladonna is the best remedy for nocturnal enuresis in children.—N. York M. J., 1907, v. 85, p. 747.

Kinyon, C. B., suggests the use of belladonna during the intermenstrual period when the flow is apt to be too scanty in plethoric

women, with a characteristic flushed face and throbbing carotids.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 384.

Rosenberger, A. S., points out that belladonna is a remedy often called for when a patient is taken down suddenly with an intense fever associated with chilly sensations.—*Ibid.*, 63rd session, p. 419.

A number of additional references on the use of belladonna will be found in the Index Medicus and the J. Am. M. Ass.

BELLADONNÆ RADIX.

Remington, Joseph P., reports that the U. S. P. VIII standard for belladonna root is *now* 0.45 per cent mydriatic alkaloids. Fluid extract of belladonna root *now* 0.4 gm. alkaloid in 100 cc.—Am. J. Pharm., Phila., 1907, v. 79, p. 135.

Rusby, H. H., asserts that there are tons and tons of belladonna root on the market which are of low grade and which can not be made to yield a preparation of standard strength. He also reports finding belladonna root deprived of its little rootlets and asserts that these rootlets are the part richest in alkaloid.—Proc. New York Pharm. Ass., 1907, p. 100.

Dohme and Englehardt assert that they have not found any belladonna root adulterated with poke root.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 378.

Rippetoe, John R., reports some assays of belladonna root and leaf cultivated in the Shenandoah Valley, Va., and describes the cultivation of the plants. A sample of leaf collected in July, when the plants were flowering, yielded 0.68 per cent of alkaloids; an average plant collected in October yielded 0.48 per cent; and a sample of root yielded 0.38 per cent alkaloids.—Am. J. Pharm., Phila., 1907, v. 79, pp. 523–524.

Kebler, Lyman F., reports that a series of comparative experiments gave from 0.370 to 0.494 per cent of mydriatic alkaloids by the U. S. P. VIII method of assay. By an aliquot part method the same drug gave from 0.516 to 0.530 per cent of alkaloids gravimetrically and from 0.384 to 0.423 per cent volumetrically.—Proc. Ass. Off. Agric. Chem., 1907, 24th Ann. Conv., p. 81 (Bull. Bur. Chem. U. S. Dept. Agric., 1908, No. 116).

Cæsar and Loretz (Geschäfts Ber., 1907, p. 99) outline their method for the assay of belladonna root and point out that the Ph. Austr. permits 6 per cent of ash in this drug and that the U. S. P. requirements for 0.5 per cent of alkaloid has been reduced to 0.45 per cent.

Dohme, A. R. L., discusses the substitution of scopola for belladonna and points out that on the established pharmacopœial precedent it would require no stretch of imagination nor a twinge of conscience to class under the caption "*belladonnæ radix*" both belladonna and scopola roots.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 504.

Caspari, Chas. E., (com. on adulterations) examined 3 samples of belladonna root; 1 satisfactory, 2 weak.—Proc. Missouri Pharm. Ass., 1907, p. 147.

Gane, E. H., reports 3 lots examined ranging from 0.52 per cent to 0.68 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

Patch, E. L., examined 3 lots, 0.33 per cent to 0.53 per cent.—*Ibid.*, v. 55, p. 324.

Sayre, L. E., reports on 7 assays of belladonna root which yielded from 0.18 to 0.70 per cent alkaloid. Average 0.44 per cent.—Bull. Kansas Bd. Health, 1907, p. 43.

Blome, Walter H., (com. on adulterations) reports that 5 samples of belladonna root assayed from 0.627 to 0.513 per cent of mydriatic alkaloids.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Troxell, H. L. (com. on adulterations), points out that on account of the scarcity of the root at present, it is claimed that from time to time adulterations with poke root occur.—Proc. Maryland Pharm. Ass., 1907, p. 86.

Vanderkleed, Charles E., (com. on adulterations) reports 9 assays of belladonna root ranging from 0.110 to 0.618 per cent. He asserts that the standard of 0.450 is still high.—Proc. Pennsylvania Pharm. Ass., 1907, p. 87.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 9) examined 24 samples of belladonna root, mainly of continental origin, which tested between 0.1 and 0.58 per cent total alkaloid. The quality generally was much better than that of some former years, and highly dried, tarry specimens, as well as the excessively clean and apparently exhausted ones, were entirely absent.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 44) report on 14 samples of belladonna root which varied from 0.159 to 0.548 per cent of alkaloids.

The New York State Board of Health, Eastern Branch, reports 12 samples examined, 3 deficient.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

Naylor, W. A. H., reviews the U. S. P assay for fluid extract of belladonna and points out that the amount of chloroform used for rinsing might be increased.—Am. Druggist, N. Y., 1907, v. 50, p. 355.

Naylor and Chappel discuss the U. S. P. method of assay for fluid extract of belladonna and compare it with Bird's modification of the Ph. Brit. process.—Pharm. J., Lond., 1907, v. 24, p. 393.

The Ph. Brit., Committee of Reference in Pharmacy points out that tincture of belladonna made from the leaf instead of the root would, of course, be totally different in appearance from the Ph. Brit. tincture. It should be standardized to 0.05 per cent of alkaloids (as at present).—Chem. & Drug., Lond., 1907, v. 70, p. 587.

Wright, R., gives a formula and outlines a method for making chloroform of belladonna, containing from 60 to 70 per cent of the available alkaloids, and also outlines a method for the determination of the alkaloids in chloroform of belladonna.—Pharm. J., Lond., 1907, v. 25, p. 107.

BENZALDEHYDUM.

Murray, Benjamin L., points out that in the official assay of benzaldehyde "purified kerosene" is used. This he thinks is a new commodity and it stands in need of a list of "tests of purity and identity" by which it may be known.—Merck's Report, N. Y., 1907, v. 16, p. 248.

Wright, E. S., experienced difficulty in determining the exact end reaction and in obtaining concordant results in the assay of benzaldehyde. Several modifications that were tried proved unsatisfactory.—Am. J. Pharm., Phila., 1907, v. 79, p. 366.

BENZINUM.

Rakusin, M., discusses the production and the source of petroleum benzin, its uses and properties, and its storage and transportation.—Chem. Ztg., Cöthen., 1907, v. 31, pp. 3-6.

Laszlo, Ernö, elaborates further on the contribution by Rakusin on the manufacture and properties of petroleum benzin.—*Ibid.*, 1907, v. 31, pp. 356-358.

Marshall, John, presents a note on a source of error in the use of a certain petroleum ether as an extracting medium. This liquid after being exposed to diffused sunlight and air in a corked storage flask for varying periods of time was found to leave cosmoline-like residues, the nature of which was not determined.—Am. J. Pharm., Phila., 1907, v. 79, pp. 315-317.

An abstract from Chem. Zeit., 1907, 31, 3, points out that in the naphtha industry "benzine" includes all fractions of petroleum boiling below kerosene (lamp petroleum) such as petroleum ether, ligroin, rigolin, and gasoline. Baku benzine is sold at a higher price than Grosny benzine, because it contains a much larger percentage of low boiling oil, as is seen from the following comparison:

	Baku benzine.	Grosny benzine.
	Per cent.	Per cent.
Below 50° C.	5.0	0.6
From 50° C. to 75° C.	47.9	13.7
From 75° C. to 100° C.	38.0	29.7

Light benzine should have a specific gravity of not more than 0.717 at 15°, and heavy benzine 0.725 to 0.729 at 15° C. It should be

neutral, evaporate rapidly from filter paper without leaving any unpleasant smell, and should contain 90 per cent of oil boiling below 95° C., and not more than 5 per cent boiling above 100°.—*Pharm. J. Lond.*, 1907, v. 24, p. 107.

Blome, Walter H. (com. on adulterations), reports that some lots have a peculiar odor and a high specific gravity.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Alcock, F. H., uses benzin (a cheap variety known as mineral naphtha, the characters of which he describes) for the preservation of solutions of albumin and of starch.—*Year Book of Pharmacy. Lond.*, 1907, p. 398.

Several references on the toxicology of petroleum benzin will be found in the *Index Medicus*.

BENZOINUM.

Nelson, Burt E., describes the origin of benzoin, calls attention to the appearance of the drug and of the powder, and enumerates the several constituents contained therein.—*Merck's Report, N. Y.*, 1907, v. 16, p. 220.

An abstract (from *Teysmannia*) gives some particulars as to the manufacture of benzoin in Sumatra.—*Canad. Pharm. J., Toronto*, 1907-8, v. 41, p. 315.

Bernegau, Henry, points out that there are four kinds of benzoin on the market: Siam, Sumatra, Penang, and Palembang varieties, of which the first two are most frequently seen in our market. He also outlines some of the characteristics of these two varieties of benzoin.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 553.

Southall's Report (1907, 7) gives the following data as a mean of 25 samples of Sumatra benzoin examined during the past year: Solubility in alcohol 90 per cent, 69.2; lowest, 58.3; highest, 77.5; free balsamic acids calculated as $\text{HC}_7\text{H}_5\text{O}_2$, 8.77; lowest, 5.31; highest, 11.55. Combined balsamic acids as above, 11.26; lowest, 8.9; highest, 12.35. One sample of Siam benzoin gave: Solubility in alcohol 90 per cent, 93.3; free balsamic acids as above, 2.59; combined balsamic acids, 32.2.—*Year Book of Pharmacy, Lond.*, 1907, p. 24.

Gausby, R. A., points out that the U. S. P. requires Sumatra benzoin to be wholly soluble in alcohol. Most cases of nice-appearing benzoin contain from 10 to 40 per cent of foreign matter, consisting chiefly of bark. Four lots ran as follows: Alcohol soluble matter from 71.22 to 85.6 per cent; ash, from 1.20 to 2.3 per cent. He reports on 1 lot of selected Siam benzoin tears assaying 97.9 per cent alcohol soluble matter; 0.17 per cent of ash.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 75.

Hankey, William T., has experienced considerable difficulty in securing benzoin of proper grade.—*Ibid.*, 1907, p. 71.

Dohme and Englehardt report on a shipment of benzoin which was rejected on account of yielding 28 per cent of ash. *Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 378.

Troxell, H. L. (com. on adulterations), found a sample that was soluble to the extent of only 50 per cent in alcohol and gave 30 per cent ash.—*Proc. Maryland Pharm. Ass.*, 1907, p. 86.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 8) give their results from 5 samples of benzoin as follows: Three Sumatra samples from 5.7 to 8.2 per cent of free benzoic acid, and from 9 to 10 per cent of combined benzoic acid; insolubility in 90 per cent alcohol from 25 to 32 per cent. Two Siam samples examined contained each 4.2 per cent of free benzoic acid, 22, 23 per cent of combined benzoic acid, and 1 and 6 per cent insoluble in 90 per cent alcohol.

Gilmour, J. P., reports the examination of 6 samples of Siam benzoin, none of which complied with Ph. Brit. requirements. He found 10 per cent insoluble residue.—*Year Book of Pharmacy, Lond.*, 1907, pp. 446-455.

The inspectors of pharmacies assert that benzoin varies enormously in its composition, some of the available drug being very inferior and mixed with vegetable and mineral substances.—*Ann. de pharm., Louvain*, 1907, v. 13, p. 276.

Philipp Röder (*Jahresbericht, Wien*, 1907, p. 109) reports on 17 samples of benzoin, which varied from 0.08 to 3.79 per cent of ash and from 0.99 to 24.62 per cent of material insoluble in alcohol. Eight of the 17 samples did not comply with the Ph. Austr. VIII requirements.

Thornewill, A. R., presents some figures obtained in the ordinary laboratory routine of testing benzoin used for making the tincture in order to arrive at the allowance necessary to make for insoluble matter. Four samples of Sumatra benzoin varying from 13.35 to 18.35 per cent of matter insoluble in 90 per cent alcohol are reported on.—*Chem. & Drug. Lond.*, 1907, v. 71, p. 824.

An abstract from the Chemist and Druggist points out that compound tincture of benzoin is a very old favorite. It is specified in the schedule to the medicine stamp act, 1812, and the year 1744 is given as the date when Robert Turlington secured his patent for the balsam. The official report of the patent and the copy of a formula published by the Philadelphia College of Pharmacy seventy years ago are reproduced.—*Drug Topics, N. Y.*, 1907, v. 22, p. 200-201.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 10) found the extractive matter in compound tincture of benzoin

(after fixing volatile acids with magnesia) to range from 18.7 to 20 per cent. These figures have been obtained from over 30 samples.

Schmidt, Valentine, outlines a simple way of mixing benzoin, glycerin, and rose water: Mix the glycerin and rose water in a bottle, shaking it well. Then pour the tincture of benzoin very slowly and carefully on the top of the mixture, cork it, take the bottle by the neck, and invert it once or twice slowly without shaking it. The result is a perfectly white emulsion, without separation or conglomeration of resin, and perfectly stable.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 346.

BENZOSULPHINIDUM.

Schweitzer, Hugo, outlines the history of the accidental discovery of saccharin and its introduction into commerce.—Am. Druggist, N. Y., 1907, v. 50, p. 194.

Bigelow and Howard (The Caterer) outline a method for the detection of saccharin and point out that the only other substance having the sweet taste which may be found in food is sugar, and that this is not soluble in chloroform.—Mdl. Drug. Columbus, 1906-7, v. 8, p. 493.

Tagliavini, Achille, (Bolletin, Chemic. Farmaceut., Fasc. 17, p. 646) discusses the determination of saccharin in wine. He recommends the use of toluol as the solvent in preference to ethyl ether or petroleum benzin.—Apoth. Ztg., Berl., 1907, v. 22, p. 890.

Wilbert, M. I., believes that the use of saccharin in the N. F., as a sweetening agent should be discouraged as there is no excuse for its use in medicinal preparations.—Am. J. Pharm., Phila., 1907, v. 79, p. 211.

La Wall, Charles H., deplotes the use of saccharin in N. F. preparations as its inclusion will be taken advantage of by persons desirous of evading the law prohibiting the use of this material in foods.—*Ibid.*, v. 79, p. 245.

Beringer, George M., regrets the introduction into the N. F. of a new "hobby" in the form of saccharin and suggests that it is an abuse that should be discontinued.—*Ibid.*, v. 79, p. 361.

Kebler, Lyman F., asserts that saccharin is generally employed as a sweetening agent and its use is largely of a deceptive character, because the consumer usually believes that when he is eating a food product sweetened with this chemical that the sweetening is due to some form of sugar. He thinks that inasmuch as deceptions and misrepresentations of all kinds are prohibited under the food and drugs act, the presence of this chemical should be declared upon the label.—J. Frankl. Inst. Phila., 1907, v. 163, p. 310.

Ripperger, Albert A., states that the replies to a number of letters from practitioners show overwhelmingly that saccharin is not in-

jurious to health and can be employed safely for sweetening foods and drinks of diabetics.—N. York, M. J., 1907, v. 86, p. 67.

Blome, Walter H., (com. on adulterations) reports that soluble saccharin which responded to benzoic-acid test with ferric chloride, was much more soluble than the official article and upon incineration left 29.9 per cent of ash.—Proc. Michigan Pharm. Ass., 1907, p. 70.

BERBERIS.

Henkel, Alice, describes and figures *Berberis aquifolium* Pursh., also known as Rocky Mountain grape, holly-leaved barberry, California barberry, trailing Mahonia, and Oregon grape.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 36-37.

Gane, E. H., points out that berberis yields from 6 to 8 per cent of extractive to the official menstruum and that the resulting fluid extract contains approximately 38.56 per cent by weight or 45.7 per cent by volume of absolute alcohol.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 319.

Schneider, Albert, points out that California Indians have long used a decoction of the root of *Berberis aquifolium* as a tonic. The bark is also used medicinally.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 416.

Johnson, E. E., points out that *Berberis aquifolium*, Pursh., was used as an alterative by the Indians and early Spanish settlers of California though it was not highly praised.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 413.

Shedd, P. W., points out that berberis is well suited to that sub-acute condition of ill health known as the bilious diathesis with a tendency to renovesical disorders and calculi in gall bladder, kidney, or bladder.—Hahnemann. Month., Phila., 1907, v. 42, pp. 915-918.

BETANAPHTHOL.

Boos, J. V. D., (Pharm. Weekbl., 1907, v. 44, p. 1478) believes that the Ph. Ndl. IV test for α -naphthol in β -naphthol is a practicable one and that the criticism by Schoorl is not justified.—Jahresb. d. Pharm. Göttingen., 1907-8, v. 42, p. 241.

Ashford and King discuss the treatment of uncinariasis, and state that betanaphthol was found to be useful but they prefer thymol. Both are unpleasant to take. The presence of food in the bowel seemed to interfere with the action of betanaphthol more than it did with thymol. A comparison is made of the number of uncinariæ expelled by doses of different agents.—J. Am. M. Ass., 1907, v. 49, pp. 471-476.

The contributor of an unsigned note quotes J. Codina Castellvi in the September *Revue de Méd.*, in regard to the favorable results following the use of betanaphthol in ankylostomiasis. He states that it

is harmless, remarkably effective and free from by-effects.—*Ibid.*, v. 49, p. 2007.

BISMUTHI CITRAS.

Lyons, A. B., points out that the ignition of an organic salt of bismuth would tend to reduce at least a portion of any contained arsenic to the metallic state when it would surely be volatilized.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 64.

BISMUTHI ET AMMONII CITRAS.

Blome, Walter H., (com. on adulterations) reports a sample of ammonium and bismuth citrate, which was acid in reaction; should be neutral or slightly alkaline.—*Proc. Michigan Pharm. Ass.*, 1907, p. 67.

The Eclectic Review considers liquor bismuthi et ammonii citras a remedy of great usefulness in the treatment of diarrhœa, and especially valuable in that caused by undigested food.—*Eclectic M. J. Cincin.*, 1907, v. 67, p. 543.

BISMUTHI SUBCARBONAS.

Frerichs, G., points out that because of the possible variation in the composition of the subsalts of bismuth the pharmacopœia should include a process for their manufacture.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 238.

Blome, Walter H., (com. on adulterations) reports that a sample of bismuth subcarbonate contained a trace of arsenic and of alkalies.—*Proc. Michigan Pharm. Ass.*, 1907, p. 67.

BISMUTHI SUBGALLAS.

Caspari, Chas. E., (com. on adulterations) examined 9 samples of bismuth subgallate, none U. S. P.; 9 contained nitrate.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

BISMUTHI SUBNITRAS.

White, Edmund, describes bismuth subnitrate, and outlines a number of tests that must be complied with by an article used as a chemical reagent.—*Pharm. J. Lond.*, 1907, v. 25, p. 104.

Lücker, Edward, points out that ammonia is a frequently found contamination in bismuth subnitrate. He believes that the titration method proposed by Thoms for the determination of the composition of bismuth subnitrate is a satisfactory one.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 1045.

Caspari, Chas. E., (com. on adulterations) examined 67 samples, none U. S. P.; all contained chloride.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

Patch, E. L., examined 19 lots which assayed from 80 per cent to 84.15 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 324.

Blome, Walter H., reports 4 samples of bismuth subnitrate, all satisfactory.—*Proc. Michigan Pharm. Ass.*, 1907, p. 67.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 11) state that although this salt is almost always free from objectionable impurities they often find it to yield distinct traces of calcium, chlorides, and sulphates.

Pfahler, G. E., discusses the physiologic and clinical observations on the alimentary canal by means of the Roentgen rays, and states that the bismuth-kefir mixture, containing bismuth subnitrate, is the best medium to render the alimentary canal opaque.—*J. Am. M. Ass.*, 1907, v. 49, pp. 2069–2074.

Böhme, A., discusses the nitrite poisoning resulting from the internal administration of bismuth subnitrate and reports some experimental work demonstrating the possibility of nitrite poisoning.—*Arch. f. exper. Path. u. Pharmacol.*, Leipz., 1907, v. 57, pp. 441–453.

The editor of the "*Therapeutical Notes*" calls attention to an article by G. Lion (in *Archives des maladies de l'appareil digestif*, Aug. through *La Tribune médicale*, Aug. 31) on the bismuth subnitrate cure in affections of the stomach, in which attention is called to the fact that the method was esteemed by Trousseau and others of the last century.—*N. York M. J.*, 1907, v. 86, p. 744.

BISMUTHI SUBSALICYLAS.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 32) reports that 1 of 3 samples of bismuth salicylate examined contained appreciable quantities of hydrochloric acid.

Gilmour, J. P., examined 8 samples, all of which contained free salicylic acid.—*Year Book of Pharmacy*, Lond., 1907, pp. 446–455.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 11) examined 5 samples of bismuth salicylate which contained from 62.17 to 64.9 per cent of bismuth oxide. The principal impurities found were free salicylic acid and traces of chloride and sulphate.

Steele, J. D., is reported to have said that he had decreased the bacteria present in normal intestines with bismuth salicylate and with betanaphthol, but in diseased intestines the normal resistance seemed to be diminished and antiseptics may have an opposite effect from that desired. In one case of gastro-intestinal disturbance the bacteria were found to be increased. He thinks that the diet affords the best means of regulating the intestinal flora.—*J. Am. M. Ass.*, 1907, v. 48, p. 1807.

BISMUTHUM.

Murray, Benjamin L., in discussing the tests for the several bismuth salts, points out that the Pharmacopœia includes no satisfactory test for purity.—Merck's Report, N. Y., 1907, v. 16, p. 248.

Caldwell, B. P., calls attention to the possibility of mistaking a bismuth stain for one caused by arsenic, and points out the importance of providing for the arrest of particles being carried over from the generator of the Marsh apparatus.—Am. J. Pharm. Phila., 1907, v. 79, pp. 201-203.

Moser, L., presents a critical study of the several volumetric determination methods for bismuth and concludes that many of the methods that have been proposed from time to time are quite useless, and that the only practicable method is the modification of the chromate method as outlined by Rupp and Schaumann.—Ztschr. f. anal. Chem. Wiesb., 1907, v. 46, pp. 223-241.

Ehrenfeld, R., discusses the volumetric determination of bismuth and records some experiments with the quantitative precipitation of bismuth, from solutions in weak nitric acid by means of sodium phosphate.—*Ibid.*, v. 46, pp. 710-711.

Howards & Sons consider that the amounts of Bi_2O_3 obtained by the ignition test in bismuthum subcarbonicum, bismuthum subgallium, and bismuthum salicylicum are all too low a standard, there being no difficulty in preparing commercial articles having, respectively, 89 to 91 per cent, 53 per cent and 64.5 per cent of Bi_2O_3 .—Chem. & Drug. Lond., 1907, v. 71, p. 693.

Hutchins and Lanher conclude that while bismuth can exist in a higher state of valence than three with oxygen, thus far the halogens have not been combined with bismuth in any higher ratio than that of the valence of three.—J. Am. Chem. Soc., 1907, v. 29, pp. 31-33.

A news note points out that the production of bismuth in the United States for 1906 amounted to a total of 8,324 pounds, less than 4 per cent of the quantity imported.—Oil, Paint, and Drug Reporter, New York, 1907, v. 72, December 2, p. 16.

BROMOFORMUM.

Caspari, Chas. E., (com. on adulterations) examined 4 samples of bromoform; 1 satisfactory, 3 contained bromides.—Proc. Missouri Pharm. Ass., 1907, p. 145.

BROMUM.

Gehe & Co. (Handels-Bericht, 1907, p. 64) discuss the production of bromine in several countries and give a table showing the exchange of this article between Germany and the United States during the years 1903 to 1906, inclusive.

White, Edmund, describes bromine, outlines tests for iodine and chlorine, organic compounds and sulphates, and calls attention to the trade varieties of bromine.—Pharm. J. Lond., 1907, v. 25, p. 104.

Escot, E. Pozzi, (Annal. de Chim. Analyt., 12, 1907, 319) describes a method for the detection of traces of bromine with the aid of the microscope.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 260.

Clarke, F. W., in the report of the international committee on atomic weights, cites Baxter's determinations, which are based upon the antecedent values $Ag=107.93$ and $Cl=35.473$. Eighteen syntheses of silver bromide gave, in mean, $Br=79.953$. Thirteen experiments upon the conversion of $AgBr$ into $AgCl$ gave $Br=79.952$.—J. Am. Chem. Soc., 1907, v. 29, p. 107. (See also p. 251.)

Hinrichs, Gustavus D., discusses the remarkably concordant results of Baxter on the atomic weight of bromine.—Compt. rend. Acad. d. Sc. Par., 1907, v. 144, pp. 973-975.

BUCHU.

An unsigned news note discusses a false buchu that has appeared in the London market. There is little doubt that the drug is derived from *B. pulchella*, a shrub 3 or more feet high, much branched, with slender twigs. The leaves are ovate, with a thickened recurved margin upon which oil glands can be readily discerned, and are minutely ciliate or downy at the base. The habitat of the plant is given as between the Cape and Drakenstein, near French Hoek, and the Paardeberg, Table Mountain, Dutoitskloof, and Witsenberg. The Hottentots are stated to powder the leaves with stones, which they mix with fat and apply to the body as a perfume.—Chem. & Drug., Lond., 1907, v. 71, p. 702.

Holmes, E. M., calls attention to a new variety of buchu leaves recently offered in the London market. The leaf is probably derived from *Barosma pulchella*, a species nearly alike to the official buchu.—Pharm. J. Lond., 1907, v. 25, p. 598.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of buchu as 70, 72, 65, 65, and 80 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

Gane, E. H., points out that buchu yields an average of 21 per cent of extractive to the official menstruum, and that the resulting fluid extract contains approximately 50.8 per cent by weight or 58.6 per cent by volume of absolute alcohol.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 319.

CAFFEINA.

Schmidt, Ernst, presents a further study on the chemistry of xanthin bases and some of the derivatives of theobromine.—Arch. d. Pharm., 1907, v. 245, pp. 389, 398.

Seidell, Atherton, contributes a paper on the solubility of caffeine.—J. Am. Chem. Soc., 1907, v. 29, pp. 1088-1091.

Gordin, H. M., reviews the progress in the chemistry of caffeine during the year 1906.—Pharm. Rev., Milwaukee, v. 25, p. 179.

Puckner, W. A., reviews the literature relating to the estimation of alkaloid in coffee, guarana, and kola.—*Ibid.*, v. 25, p. 321.

Sayre, L. E., describes coffee, its standardization and possible application in pharmacy; also gives the ash determination in a number of varieties of coffee.—Merck's Report, N. Y., 1907, v. 16, pp. 61-63.

Weevers, Th., (Annales du Jardin botanique de Buitenzorg, ser. ii, vol. vi) says that xanthin derivatives were found in all parts except the roots of *Thea assamica* and *Coffea arabica*, but only in the early vegetative stages of *Coffea stenophylla* and *Cola acuminata*. From a comparison of the quantities obtained in young and maturing leaves, also in leaves placed in air devoid of carbon dioxide, the author concludes that these substances are formed as secondary products in the breaking down of proteins, and are subsequently absorbed in protein synthesis; in the seeds they are plentiful, forming a nitrogenous reserve.—Pharm. J. Lond., 1907, v. 25, p. 315.

Swabe, Willmar Jun., discusses the chemistry of pseudotheobromine and its relation to theobromine and theophyllin.—Arch. d. Pharm., 1907, v. 245, pp. 389-405.

French, J. M., discusses caffeine, its sources and uses, and reviews its physiological action at some length.—Merck's Arch., N. Y., 1907, v. 9, pp. 208-210.

Caspari, Chas. E., (com. on adulterations) examined 14 samples of caffeine; 12 satisfactory; 2 contained other alkaloids.—Proc. Missouri Pharm. Ass., 1907, p. 143.

Rivers and Webber discuss the action of caffeine on the capacity for muscular work. They record a number of experiments and conclude that while they confirm the observations of previous experimenters that caffeine produces an increase in the capacity for muscular work, they have also been able to provide definite evidence of the presence of a double action on the part of caffeine, which they describe at some length.—J. Physiol., Lond., 1907-8, v. 36, pp. 33-48.

Friedländer, Richard, discusses the use of caffeine as a cardiac remedy and reviews some of the literature relating to its use.—Therap. Monatsh., Berl., 1907, v. 21, pp. 178-179.

Additional references on the use of caffeine will be found in the Index Medicus and the J. Am. M. Ass.

CALAMUS.

Henkel, Alice, describes and figures *Acorus calamus* L., commonly known as sweet cane, sweet grass, sweet myrtle, sweet rush, sweet sedge, sweet segg, sweetroot, cinnamon sedge, myrtle flag, myrtle

grass, myrtle sedge, and beewort.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, p. 16.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official extract of calamus as 71, 72, 65, 85, and 65 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

CALCII BROMIDUM.

Murray, Benjamin L., points out that the reaction of calcium bromide is best taken in 1 to 20 solution. No strength is specified at present.—Merck's Report, N. Y., 1907, v. 16, p. 248.

Patch, E. L., examined one sample assaying 97.8 per cent and containing a trace of bromate.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

Blome, Walter H., (com. on adulterations) reports on 2 samples of calcium bromide. One contained a little barium.—Proc. Michigan Pharm. Ass., 1907, p. 67.

CALCII CARBONAS PRÆCIPITUS.

White, Edmund, describes calcium carbonate, outlines a number of tests to which an article suitable for use as chemical reagent must comply, and describes the available trade varieties.—Pharm. J. Lond., 1907, v. 25, p. 104.

Blome, Walter H., reports that heavy precipitated chalk always contains iron, aluminum, and phosphates.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Philipp Röder Wien, reports on 9 samples of precipitated calcium carbonate, 5 of which complied with the Ph. Austr. VIII requirements, while the remaining 4 were contaminated with sulphates and alkalies.—Pharm. Post, Wien, 1907, v. 40, p. 323.

Evans Sons Lescher and Webb (Analytical Notes, 1907-8, p. 12) report many specimens which were heavily contaminated with iron and aluminum. In one case only they discovered a heavy arsenical contamination. They believe this sample was most probably a by-product of some manufacturer.

Netter, Arnold, discusses the medical applications of the antitoxic power of the salts of calcium and their employment in albuminuria.—Compt. Rend. Soc. de biol., Par., 1907, v. 62, pp. 329-331.

He presents a further note on the efficacy of calcium salts in the treatment of urticaria, acute œdema, chilblains, and pruritis.—*Ibid.*, v. 62, pp. 462-465, 572-575.

Stewart, W. R., points out that "calcarea carb." is best suited to the case that is fair, fat, and flabby, perspires about the head, with low temperature of body and extremities.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 495.

Blackwood, A. L., points out that "calcareo carbonica" is indicated in cases where metabolism is imperfect.—*Ibid.*, p. 486.

Clark, B. J., points out that "calx carb." is a valuable remedy in rachitis and one whose symptomatology is well known.—*Ibid.*, p. 476.

CALCII CHLORIDUM.

White, Edmund, describes crystallized calcium chloride and outlines the tests for securing an article suitable for use as a chemical reagent.—Pharm. J. Lond., 1907, v. 25, p. 105.

Netter, Arnold, discusses the good effects of the administration of calcium chloride in a variety of conditions.—Compt. rend. Soc. de biol., Par., 1907, v. 62, pp. 376-379; pp. 632-634. See also *ibid.*, v. 63, pp. 457-459; pp. 465-466; pp. 581-583; J. de pharm. et de chim. Par., 1907, v. 26, p. 188.

Robertson, Illmen, and Duncan, in the report of a comprehensive study of the factors influencing the coagulation of the blood, present some observations on the use of calcium chloride and other salts of calcium. They conclude that the clinical employment of the calcium salts has no direct or invariable effect on the coagulation time of the blood, either in large doses one hour after its administration or in small or large doses at any subsequent period, even extending over two or more weeks.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, pp. 51-57.

Russell, W. B., states that he treated a case of purpura with calcium chloride which proved rapidly effective.—Brit. M. J., 1907, v. 1, p. 199.

For additional references on the use of calcium chloride see the Index Medicus and the J. Am. M. Ass.

CALCII HYPOPHOSPHIS.

Sayre, L. E., reports finding phosphates and sulphates in calcium hypophosphite.—Bull. Kansas Bd. Health, 1907, p. 13.

Blome, Walter H., (com. on adulterations) reports 6 samples of calcium hypophosphite. One had a trace of calcium sulphate.—Proc. Michigan Pharm. Ass., 1907, p. 67.

CALCII PHOSPHAS PRÆCIPITATUS.

Blome, Walter H., (com. on adulterations) reports on 2 samples of calcium phosphate which contained considerable amounts of chloride.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Caspari, Chas. E., (com. on adulterations) examined 10 samples; all contained large excess of chloride; 2 contained arsenic.—Proc. Missouri Pharm. Ass., 1907, p. 145.

Evans Sons Lescher and Webb (Analytical Notes, 1907-8, p. 13) still find iron, copper, sodium chloride, and chiefly lead in calcium

phosphate. Iron is often present in objectionable quantities, and they have found up to 4 per cent of sodium chloride.

A distinct arsenical contamination was noticed in two samples. All of these impurities are likely to cause untoward results, especially when the substance is used as a filtering medium.

Blackwood, A. L., points out that "calcareo phosphorica" is indicated in cases of defective nutrition.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 486.

CALCII SULPHAS EXSICCATUS.

An article abstracted from Marco Pedrotti's "Der Gips und seine Verwendung," discusses the widespread use of gypsum, its introduction by the Egyptians of old, and its continued use to the present time.—Sc. Am. Suppl., N. Y., 1907, p. 63, pp. 26033-26034.

De Forcrand (Bull. soc. chim. Montpellier, 1906, 35, pp. 781-790) reports the results of researches on plaster of Paris and describes several forms of calcium sulphate which he recognizes.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 146.

Davis, W. A., discusses the nature of the changes involved in the production and setting of plaster of Paris, and records a number of experiments. This article is illustrated with curves showing the nature of the changes occurring during dehydration of gypsum and the subsequent recrystallization with water.—J. Soc. Chem. Ind., Lond., 1907, v. 26, pp. 727-738.

Evans Sons Lescher and Webb (Analytical Notes, 1907-8, p. 13) have proved calcium sulphate to be practically free from arsenium on several occasions.

CALUMBA.

Feist, K., reviews the literature and discusses the chemistry of the alkaloids of calumba.—Pharm. Post., Wien, 1907, v. 40, pp. 659-660.

Puckner, W. A., calls attention to the work by Gadamer and Günzel in the study of the alkaloid content of calumba.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 323.

Feist, K., presents a contribution to our knowledge of the alkaloids and bitter principles of calumba, in the course of which he reviews the origin and history of the drug and also the work that has been done in the separation and identification of the several alkaloids it contains. He records his own experiments at some length.—Arch. d. Pharm., 1907, v. 245, pp. 586-637. See also Ztschr. d. Allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 137.

Taylor, S., reports on the examination of a small sample of sliced root which had been detected mixed with calumba root in small

percentage. The root is described and figured.—Pharm. J. Lond., 1907, v. 25, p. 121.

Ulrich, Th., reviews the work that has been done on the constituents of calumba root, the production of calumbin, the properties of calumbin, the composition of the substance, and the action of several reagents on the substance.—Ztschr. d. Allg. österr. Apoth.-Ver., Wien, 1907, v. 45, pp. 87–89.

Parker, R. H., presents some observations on tincture of calumba made from true and suspected calumba root. He also asserts that a tincture of calumba prepared from the cortical portion of the root contains the bulk of the active principles, while a tincture prepared from the decorticated portion is pale and deficient in bitterness.—Pharm. J. Lond., 1907, v. 25, pp. 181–182.

Niece, Frederic E., outlines a color reaction for testing the identity of tincture of calumba. He also suggests determining the extract content.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 481.

CALX.

White, Edmund, asserts that the most suitable form of lime for use as a reagent is obtained by heating clean selected pieces of marble. He describes the physical properties of this article, gives tests, and discusses the available trade varieties of lime.—Pharm. J. Lond., 1907, v. 25, p. 540.

Phillip Röder (Jahresbericht, Wien, 1907, p. 33) reports that of 9 samples examined 5 complied with the official requirements, and the remaining samples contained appreciable quantities of sulphates and alkalies.

Evans Sons Lescher and Webb (Analytical Notes, 1907–8, p. 13) assert that commercial varieties of slaked lime will often be found to contain arsenium up to 8 parts per million.

CALX CHLORINATA.

Schwarz, Eugen, discusses the valuation of chlorinated lime, reviews some of the literature on the subject, and records some additional experiments.—Ztschr. f. ang. Chem., Berl., 1907, v. 20, pp. 138–143.

Dietz, H., criticizes the communication by Schwarz on chlorinated lime and points out that without a thorough knowledge of the available literature and a full consideration of all of the factors that have been presented the question of composition and formation of chlorinated lime can hardly be definitely determined upon.—*Ibid.*, v. 20, pp. 754–757.

Bachman, Gustav, found chlorinated lime to be of very varying chlorine content. One sample assayed 29.25 per cent, another 5.38

per cent, and another 0.16 per cent, instead of 30 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, pp. 40–41.

Sayre, L. E., reports 3 assays of chlorinated lime which yielded 32, 2.2, and 15.4 per cent of available chlorine, respectively.—Bull. Kansas Bd. Health, 1907, p. 11.

Baird, J. W., (com. on adulterations) reports on 14 samples; 2 genuine, 12 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 39.

CALX SULPHURATA.

Dohme and Englehardt report a few samples of calx sulphurata containing only from 45 to 50 per cent CaS.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 379.

Troxell, H. L., (com. on adulterations) found several samples to contain less than 55 per cent of calcium sulphide, as required by the U. S. P. (Revised).—Proc. Maryland Pharm. Ass., 1907, p. 86.

Gilmour, J. P., reports 4 out of 12 samples not up to Ph. Brit. requirements; deficient in sulphide.—Year Book Pharm., Lond., 1907, pp. 446–455.

Morgan, F. C., discusses some new uses for calcium sulfide and reports a number of cases.—Critic and Guide, N. Y., 1907, v. 8, February, p. 20.

CAMBOGIA.

Nelson, Burt. E., discusses the nature and origin of gamboge and points out that under the microscope, beside the amorphous masses, are found numbers of pitted stone cells and some fragments of elongated sclerotic tissues. Prisms of calcium oxalate, parenchyma, fiber fragments, and sandy fragments may also be found.—Merck's Rep., N. Y., 1907, v. 16, p. 192.

Gausby, R. A., reports that gamboge mass is invariably of inferior quality. He examined 4 lots of gamboge powder in which the alcohol soluble matter varied from 58 to 73.6 per cent, ash from 1.35 to 6.8 per cent, and acid value from 55.7 to 85.4 per cent. One lot contained considerable starch, evidently added to an inferior resin to keep the powder from running together.—Proc. Pennsylvania Pharm. Ass., 1907, p. 75.

Patch, E. L., examined 2 samples, 41 and 35 per cent, insoluble in alcohol, respectively. Both samples contained starch.—Proc. Am. Pharm. Ass. 1907, v. 55, p. 325.

CAMPHORA.

Cohn, Alfred I., points out that the official definition of camphor excludes the possible use of the synthetic product as camphor, to comply with the requirements of the U. S. P., must be "the dextrogy-

rate modification of the saturated ketone, etc." The camphor made synthetically is optically inactive.—Proc. N. Y. Pharm. Ass., 1907, p. 232.

Rusby, H. H., discusses the origin and production of camphor.—J. Soc. Chem. Ind., Lond., 1907, v. 26, pp. 380–381.

An editorial discusses the economic conditions in the camphor market.—Pharm. J., Lond., 1907, v. 24, p. 688.

An editorial discusses the outlook of camphor, the estimated annual consumption, the steady increase in the production of celluloid, and the difficulty in the way of cultivating the camphor plant.—*Ibid.*, v. 24, p. 803.

The Secretary of Agriculture reports that drug gardens are now established at a number of points, and as a result of this work it is believed that the camphor industry has been established on a firm basis. A large acreage is being planted in Florida, and interest in the growing of this crop is shown elsewhere. From 3,000 to 4,000 acres of the trees are being prepared for planting in Florida alone.—Ann. Rep. U. S. Dept. Agric., 1907, 1908, p. 57.

An editorial points out that camphor grows well on the entire coast of California, and in places it occurs spontaneously. The plant is rich in camphor of first quality.—Pacific Pharm., San Francisco, 1907–8, v. 1, p. 429.

Gehe & Co. (Handels-Bericht, 1907, pp. 14–15) discuss the annual production of camphor, which is estimated as 60,000 piculs for Formosa and 10,000 piculs for Japan, and point out that the Japanese Government during the past year has furnished more than one million of young camphor trees, of which, it is estimated, only about 30 per cent will grow to maturity.

An editorial discusses the production of camphor in Japan and points out that the world's demand for this article is estimated at upward of ten million pounds, and that fully 70 per cent of the total production is absorbed in the manufacture of celluloid, the remaining 30 per cent being utilized in the manufacture of: gun cotton 2 per cent, disinfectants and deodorizers 15 per cent, and spirituous or medicinal preparations 13 per cent.—Chem. & Drug., Lond., 1907, v. 70, pp. 834–835.

A review of the present status of the chemical industries of Japan presents some figures on the production of camphor in Japan and Formosa, and the amount and value of this product exported during the years 1905 and 1906.—Chem. Ind., Berl., 1907, v. 30, pp. 399–401.

Schultze, Louis, points out that a Japanese newspaper is authority for the statement that the demand for camphor has increased to 10,500,000 pounds annually, and that the Tokio Government has under consideration a project for the planting of large camphor forests.—Proc. Maryland Pharm. Ass., 1907, p. 45.

An unsigned abstract points out some of the efforts that have been made to increase the production of camphor in Formosa to meet the world's requirements, and discusses the process of extraction from the leaves and twigs that has been recently devised. The quality of camphor thus obtained is said to be in no way inferior.—*Oil, Paint, and Drug Reporter*, N. Y., 1907, v. 72, July 1, p. 16.

Cayla, V., discusses the production of natural camphor in Formosa, China, Ceylon, Algeria, and Tonkin.—*J. d'Agric. Trop. Par.*, 1907, v. 7, pp. 335–338. (See also *ibid.*, v. 7, pp. 295–297 and 382.)

An editorial notes that camphor was produced in Japan during the past year to the extent of five and a half million pounds, more than half of this being exported to foreign countries.—*Chem. & Drug.*, Lond., 1907, v. 70, p. 586.

An editorial discusses the development of the camphor industry in China and its relation to the Japanese production.—*Oil, Paint, and Drug Reporter*, N. Y., 1907, v. 72, July 15, p. 8.

Bamber, M. Kelway, reports on the experiments that are being made to introduce the cultivation of camphor into Ceylon, and also presents some information on the price of camphor and the world's consumption of that article.—*Bull. Dept. Agric.*, Jamaica, 1907, v. 5, pp. 234–240.

Nock, J. K., discusses the propagation of camphor, by seeds, by layers, by branch cuttings, by root cuttings, and by suckers.—*Circ. & Agric. J. Roy. Bot. Gard.*, Ceylon, 1907, pp. 13–20.

Beille and Lemaire discuss the production of camphor and the possible cultivation of the camphor tree.—*Bull. Soc. de pharm. de Bordeaux*, 1907, v. 47, pp. 321–329.

Eckert presents a compilation of the reports of planters in German East Africa who have experimented with the seed of Japanese camphor trees.—*Der Pflanze*, Tanga, 1907, v. 3, pp. 317–320.

An unsigned article reviews the efforts that are being made to encourage the propagation of camphor plants in various parts of the world.—*Chem. & Drug.*, Lond., 1907, v. 71, p. 319.

The British consul at Foochow (China) reports that the quantity of camphor exported from that port has increased from 4,805 cwt. in 1905 to 13,535 cwt. in 1906. He discusses the cultivation of the camphor tree and the possibilities of economic production of the drug.—*Brit. & Col. Drug.*, Lond., 1907, v. 52, p. 208.

Battandier, J. A., contributes a brief note on camphor trees and camphor of Algeria.—*J. de pharm. et de chim. Par.*, 1907, v. 25, p. 182.

Breteau, P., discusses the process of manufacture of synthetic camphor.—*Ibid.*, v. 25, pp. 186–190.

Coblentz, Virgil, discusses the history and the use of camphor in pharmacy and medicine and includes a bibliography on the history of camphor.—*J. Soc. Chem. Ind., Lond., 1907, v. 26, pp. 382-383.*

An editorial points out that artificial camphor is now a reality and that continental firms are engaged in its production; also discusses the several methods followed in its manufacture.—*Pharm. J. Lond., 1907, v. 25, p. 595.*

Hempel, Albert, discusses the present status of the manufacture of camphor, the production of natural camphor, the production of synthetic camphor, and the several processes that have been developed for this latter purpose.—*Chem. Ztg., Cöthen, 1907, v. 40, pp. 6-8.*

Hesse, A., criticises the communication by Hempel, particularly his descriptions of the several methods for the production of camphor synthetically.—*Ibid., v. 31, p. 101.*

Pond, F. J., discusses the synthesis of camphor, outlines the chemistry, and presents a comprehensive bibliography.—*J. Soc. Chem. Ind., 1907, v. 26, pp. 383-386.*

Cayla, V., discusses the production of synthetic camphor, the principles that are involved and the processes that are now being employed.—*J. d'Agric. trop., Par., 1907, v. 7, pp. 227-229.*

Kebler, L. F., reviews the production, uses, and chemistry of camphor and the efforts that have been made to produce the substance synthetically. He believes that the outlook for making camphor both synthetically and from natural sources in the United States is promising.—*Am. J. Pharm., Phila., 1907, v. 79, pp. 348-356.*

Tutin, Frank, discusses the paper by Kebler and points out several inaccuracies in the structural formulæ.—*Ibid., v. 79, pp. 551-553.*

Kebler, L. F., accepts one correction but believes other criticisms are not well founded.—*Ibid., v. 79, pp. 579-580.*

Dohme, A. R. L., reviews the progress that has been made in the synthesis of camphor, and discusses, at some length, the process invented by Prof. Behal.—*Proc. Am. Pharm. Ass., 1907, v. 55, pp. 457-462.*

The same author presents considerable data relating to the production of camphor.—*Ibid., v. 55, pp. 462-465.*

A news note reports a decision in the U. S. circuit court to the effect that artificial camphor is not a refined article and is not therefore subject to duty.—*Oil, Paint, and Drug Rep., N. Y., 1907, v. 72, Dec. 2, p. 10.*

Doremus, Chas., asserts that no synthetic camphor is being made in America, the works formerly employed with this production having been closed.—*J. Soc. Chem. Ind., Lond., 1907, v. 26, p. 388.*

Kline and Graham report that they found synthetic (?) camphor consisting of naphthalene with a small percentage of added camphor.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 83.

An abstract from a report of a French consular officer asserts that a plant has recently been discovered in Borneo and Sumatra which contains a substance identical with camphor.—*Pharm. J. Lond.*, 1907, v. 24, p. 46.

Droebegg, Gustav, discusses the purifying and refining of natural camphor, and points out that the principal methods employed are resublimation, condensation, and crystallization. The rare kinds of camphor, Borneol, Chinese, Sumatra, etc., do not come into consideration from the point of view of the refiner. The principal impurities of camphor are water, camphor oil, iron, sand, wood, etc.—*J. Soc. Chem. Ind., Lond.*, 1907, v. 26, pp. 381–382.

Klose, G., finds that adeps lanæ will readily dissolve 11 per cent or more of camphor at 45° C.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, p. 463.

Schuepphaus, R. C., discusses the technical application of camphor, points out that two-thirds of the total production of camphor is consumed in the celluloid industry, and that the widespread idea that camphor enters widely into the manufacture of explosives and smokeless powders has no foundation in fact.—*J. Soc. Chem. Ind., Lond.*, 1907, v. 26, p. 383.

Crane and Joyce present some notes on the analysis of camphor, and point out that this is a subject of growing importance, owing to the high prices now prevailing and the introduction into the market of synthetic camphors which vary in composition and contain impurities different from those found in the natural article.—*Ibid.*, v. 26, pp. 386–388.

Dohme, A. R. L., points out that Langgaard and Maas have demonstrated that synthetic camphor is racemic, that is, optically inactive, because it is composed of equal portions of lævo and dextro camphor. Natural camphor on the other hand is composed of either lævo or dextro camphor depending on the pinene from which it originated in the tree itself.—*D.-A. Apoth.-Ztg.*, N. Y., 1907, v. 28, p. 148.

Bohrisch, P., outlines a new application of the well-known vanillin hydrochloric acid test by means of which it is possible to differentiate between natural and synthetic camphor.—*Pharm. Zentralh.*, 1907, v. 48, pp. 527–531; 777–780.

Baselli, A., (*Giro. di farm. de Triesta*, 1907, p. 2) gave two tests for the recognition of the purity of synthetic camphor.—*Réport. de pharm.*, 1907, v. 19, p. 125.

Gausby, R. A., reports that no adulterated samples of camphor were found. Nine samples gave melting points ranging from 153–176° C.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 79.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907–8, p. 13) examined 90 samples of camphor. The rotation of 20 per cent w. v. alcoholic solutions (taken in 100 mm. tube) ranged from +4° 30' to +9° 6'. On two occasions it fell as low as +4° 30', and on 5 it was found to lie between +5° and +6° 52'. In the remainder it ranged from +8° 10' to +9° 6'. They assert that synthetic camphor is now a commercial possibility and give the results from the examination of two samples of synthetic camphor of English make.

Arnost, Alois, outlines a method for determining the camphor content of alcoholic solutions by shaking out with petroleum benzin in a special, graduated tube. The solution of camphor is diluted with nine times its measure of water and the mixture then shaken out with petroleum benzin noting the change in volume of the latter.—*Schweiz. Wehnschr. f. Chem. u. Pharm.*, Zürich, 1907, v. 45, pp. 40–42.

Seymour, James, outlines a simple method of estimating camphor and alcohol in spirit of camphor.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 443–444.

Gallois, Chas., says that the figures given by the Comité Disciplinaire de la Chambre Syndicale des Pharmaciens de la Seine, +6° 30' (+30° saccharimeter) should be considered only as a sort of average about which the ascertained deviations oscillate.—*J. de pharm. et de chim.*, Par., 1907, v. 26, pp. 99–101.

Thurston, Azor, quotes Holderman as calling attention to the fact that each degree of dextrogyration in spirit of camphor corresponds to 1 per cent, by weight, of camphor, or, in other words, the U. S. P. spirit of camphor should rotate the plane of polarization to the right, and in round numbers +10° (9.6°); and if a 200 mm. tube is used the reading on the Ventzke scale should be +28.8° (27.6°).—*Merck's Rep.*, N. Y., 1907, v. 16, p. 124.

Coblentz, Virgil, outlines a test for acetone in spirit of camphor.—*Ibid.*, v. 16, p. 68.

Barnard, H. E., reports that out of 65 samples of spirit of camphor examined only 15 were pure; the other 50 were below standard equivalent to an adulteration of 76.9 per cent.—*Rep. Indiana Bd. Health*, 1907, p. 190.

Lythgoe, Hermann C., reports that 31 out of 250 samples of spirit of camphor examined were found to be low in camphor. The camphor contained in these samples varied from 2.5 to 95 gms. of camphor per liter.—*Rep. Massachusetts Bd. Health*, 1907–8, p. 383.

The N. Y. State Board of Health, Eastern Branch, examined 325 samples, 13 deficient.

The Massachusetts State Board of Health examined 13 samples; 7 varied from 25 per cent to 70 per cent of required strength.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 324.

Baird, J. W., (com. on adulterations) reports on 25 samples, 17 genuine, 8 adulterated.—*Proc. Mass. Pharm. Ass.*, 1907, p. 40.

Philip Röder Wien, reports examining 11 samples of spirits of camphor. The specific gravity varied from 0.900 to 0.905; the Ph. Austr. VIII requires 0.9015 to 0.902.—*Pharm. Post*, Wien, 1907, v. 40, p. 376.

"Gnomon" calls attention to opinions expressed on camphorated oil, which may be briefly summarized as asserting that if the proper quantity of camphor has been used in preparing the oil, any subsequent loss must be attributed to carelessness in preparation or storage.—*Pharm. J.*, Lond., 1907, v. 25, p. 102.

Harrison, E. F., discusses the methods for making camphor liniment and points out that if heat is employed in making this preparation very serious loss of camphor may occur.—*Ibid.*, v. 25, p. 69.

Chapman, Alfred, Chaston, discusses the assay of camphorated oil and the possibility for the deteriorations of this article and points out that with a reasonable amount of care the loss of camphor by volatilization will be so small as to be practically negligible.—*Ibid.*, v. 25, p. 68.

Thurston, Azor, asserts that the polariscope reading of liniment of camphor in 200 mm. tube at 25° C. is +58.5°. He quotes Dowzard as stating that when the Laurent instrument is employed, and a 100 mm. tube, the factor 1.962 should be used.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

Gilmour, J. P., found 6 samples of camphor liniment deficient in camphor. He has satisfied himself by repeated estimations of liniment of camphor stored under diversified conditions that it loses but a trifling amount of camphor at ordinary temperatures. The essential thing is to put in all the camphor.—*Pharm. J.*, Lond., 1907, v. 25, p. 110.

The annual report of the local government board for England and Wales points out that of 346 samples of camphorated oil examined, 37 were found to be adulterated or not up to the standard.—*Chem. & Drug.*, Lond., 1907, v. 71, p. 828.

Klemperer, Felix, discusses the influence of camphor on the action of the heart, and records a number of experiments and observations.—*Ztschr. f. exper. Path. u. Therap.*, 1907, v. 4, pp. 389–397.

Friedländer, Richard, discusses the use of camphor as a cardiac remedy, reviews the literature relating to its pharmacology and use in the practice of medicine and points out that as yet it has not been possible to demonstrate, by experiments on animals, all of the several

influences of camphor on the animal organism.—*Therap. Monatsh. Berl.*, 1907, v. 21, pp. 176-178.

Rosenberger, A. S., points out that camphor is a remedy that covers the extreme feebleness with a sense of fainting; face very pale; pulse small and low. The symptoms change rapidly to the opposite conditions, rapid pulse, anxiety, fear of death, pleuritic stitches, sighing, and moaning.—*Tr. Am. Inst. Homœop.*, 1907, 63rd session, p. 419.

Additional references on the production, testing, and use of camphor will be found in the *Oil, Paint, and Drug Reporter*, the *Experiment Station Record*, and in *Chemical Abstracts*.

CAMPHORA MONOBROMATA.

Thurston, Azor, suggests the use of the polariscope on the examinations of monobromated camphor and gives its optical rotation as being $+40^\circ$.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

CANNABIS INDICA.

Dohme, A. R. L., believes that as yet the experiments to cultivate Indian cannabis have not been successful, but asserts that there is every indication that in the course of a few years America and Germany will be in a position to produce a physiologically active drug.—*D.-A. Apoth.-Ztg.*, N. Y., 1907, v. 28, p. 133.

Patch, E. L., examined 7 samples containing from 10 per cent to 12.8 per cent of ether-soluble resin.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 324.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 79) reports that of 5 samples of cannabis indica examined one exceeded the official limitation for ash, containing 16.68 per cent; the remaining samples varying from 12.56 to 14.77 per cent.

Gane, E. H., points out that cannabis indica yields approximately 10 to 12 per cent of extract to the official menstruum, and that the resulting fluid extract contains about 80 per cent by weight or 85.9 per cent by volume of absolute alcohol.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 319.

Czerkis, Max, makes a contribution to our knowledge of Indian cannabis in which he reviews some of the literature relating to the action of hasheesh and describes cannabinal, the active constituent of hasheesh. He also records experiments on the oxidation of cannabinal with concentrated nitric acid and its behavior with powdered zinc.—*Pharm. Post*, Wien, 1907, v. 40, pp. 49-51, 69-70, 97-99.

Houghton and Hamilton record a pharmacological study of *Cannabis americana* (*Cannabis sativa*). From their own observations and from reports received from medical practitioners, they conclude that American cannabis is equally as good and perhaps better than

Cannabis indica obtained from foreign countries.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 445–448.

An editorial calls attention to the article of Auguste Marie, *Nouvelle iconographie de la Saltpetrière*, May–June, relating to the control of the hasheesh trade, particularly among the Arabs, and to insanity caused by hasheesh.—N. Y., M. J., 1907, v. 86, p. 651.

CANTHARIS.

Peltriset, C. N., makes a contribution to the microscopic study of powdered cantharides. Five plates.—Bull. d. sc. pharmacol., Par., 1907, v. 14, pp. 262–277.

Dohme and Englehardt suggest that a process for the determination of cantharidin should be given.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 379.

Eldred and Bartholomew outline a method for the estimation of cantharidin in cantharides and in preparations of that drug.—*Ibid.*, v. 55, pp. 360–364.

Self and Greenish review the published work on the chemistry of cantharides and outline a method for the determination of cantharidin, which depends on the solubility of that principle in hot water.—Pharm. J., Lond., 1907, v. 24, pp. 324–328. (See also p. 321.)

Krause, Kunz, reports that on analysis of the sebacic-acid by-product obtained from the production of cantharidin from Chinese cantharides, a portion of the mass (which melted at 60°) remained unmelted, and on further treatment 30 gms. of cantharidin was obtained from 750 gms. of it. The cantharidin melted at 210°.—Chem. & Drug., Lond., 1907, v. 71, p. 612.

Patch, E. L., examined 8 samples of Russian cantharides ranging from 0.40 per cent to 0.86 per cent of cantharidin.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

Blome, Walter H., (com. on adulterations) reports on 4 samples of cantharides: Varied from 0.495 to 1.094 per cent of cantharidin.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 79) discuss the estimation of cantharidin in cantharides. The cantharidin content required by the Ph. Germ. is 0.8, Ph. Belg. 0.6, and Ph. Ndl. 0.6–0.8 per cent. The Ph. Ndl. permits 9 per cent of ash; other pharmacopœias, including the U. S. P., limit the ash content to not more than 8 per cent.

Philipp Röder (Jahresbericht, Wien, 1907, p. 34) reports that 3 of the 4 samples of cantharides examined were well within the (Ph. Austr. VIII) 8 per cent limit for ash, the remaining sample contained 10.29 per cent of ash.

The inspectors of pharmacies found cantharides that had undergone complete putrefaction.—Ann. de pharm., Louvain, 1907, v. 13, p. 276.

Hartwich reports observations on a sample of so-called Mexican cantharides which he concludes consisted of a heterogeneous mixture of insects and sand, containing no cantharidin and having nothing in common with cantharides.—*Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich*, 1907, v. 45, pp. 73-74.

Spindler reports a sample of cantharides deficient in cantharidin 0.618 per cent in place of 0.80 per cent required by the pharmacopœia.—*Suedd. Apoth. Ztg.*, 1907, v. 47, p. 50.

Greenish, Henry G., points out that the international agreement required 1 in 10 of 70 per cent alcohol. All the pharmacopœias agree, except the Austrian (90 per cent alcohol) and the U. S. (weight in volume).—*Pharm. J. Lond.*, 1907, v. 24, p. 833.

Klose, G., finds that adeps lanæ will dissolve 4.2 per cent of cantharidin.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, p. 463.

The inspectors of pharmacies found few satisfactory samples of ointment of cantharides. They point out that the use of this ointment has perceptibly diminished.—*Ann. de pharm. Louvain*, 1907, v. 13, p. 377.

The editor of "Therapeutic Notes" quotes the report of Anthaeume and Mignot (*Le Bulletin médical*, Aug. 7, 1907) of an unusual result from the application of a cantharidal blister to a man who had been addicted to alcoholism but who had abstained for a long period. Cantharidal nephritis was induced with a tendency to delirium.—*N. Y. M. J.*, 1907, v. 86, p. 554.

CAPSICUM.

Nelson, Burt E., describes and figures the structure of capsicum and calls attention to some of the characteristic cell formations and cell content.—*Merck's Report*, N. Y., 1907, v. 16, p. 130.

Judd, Albert F., found the ash in 10 samples of capsicum to vary from 3.2 to 18.4 per cent.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 260.

Baird, J. W., (com. on adulterations) reports on 25 samples, 22 genuine, 3 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 39.

Patch, E. L., examined 10 samples varying from 16.2 per cent to 26.5 per cent alcoholic extract. One sample contained a notable amount of starch.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 324.

Barnard, H. E., reports that of the 96 samples of tincture of capsicum analysed, 43 were pure and 53 adulterated, equivalent to a percentage of adulteration of 55.2 per cent.—*Rep. Indiana Bd. Health*, 1907, p. 191.

CARBO LIGNI.

Kline and Graham report on a lot of charcoal which, upon investigation, was found to contain 60 per cent of moisture. They also

discuss the decolorizing properties of charcoal.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 83.

Evans Sons Lescher and Webb (*Analytical Report*, 1907–8, p. 15) examined 3 samples of powdered acacia, willow, and ordinary charcoal having an ash content of 5.12, 11.40, and 10.15 per cent, respectively. Two samples of ordinary whole charcoal assayed an ash content of 15.90 and 1.80 per cent. They call attention to the fact that the acacia variety is well below the *Ph. Brit.* figure ($7\frac{1}{2}$ per cent), whilst the ordinary commercial kind is much higher.

White, Edmund, describes animal charcoal as a dry, black, and fine powder, gives tests, and discusses the trade varieties.—*Pharm. J. Lond.*, 1907, v. 25, p. 540.

Knecht, Edmund, presents some observations on the decolorizing action of animal charcoal and reviews some of the available publications from the time of Figuier, in 1811, who first called attention to the use of animal charcoal for decolorizing liquors.—*Ibid.*, v. 25, p. 154.

Rosenthaler, L., reviews the criticisms made by Glaszner and Suida on the work done by Rosenthaler and Türck to determine the decolorizing action of animal charcoal. He concludes that the decolorizing and absorption phenomena are due to physical processes modified by the reactions between the components of the charcoal and the materials to be absorbed.—*Arch. d. Pharm.*, 1907, v. 245, pp. 686–689.

CARBONEI DISULPHIDUM.

Caspari, Chas. E., (com. on adulterations) examined 3 samples of carbon disulphide; 1 satisfactory; 2 left residue on evaporation.—*Proc. Missouri Pharm. Ass.*, 1907, p. 146.

Blome, Walter H., (com. on adulterations) reports on many samples of carbon disulphide; all contained free sulphur.—*Proc. Michigan Pharm. Ass.*, 1907, p. 67.

CARDAMOMUM.

Nelson, Burt E., describes and figures the structural characteristics of cardamom.—*Merck's Report*, N. Y., 1907, v. 16, p. 131.

Michael, W. H., points out that both the greater and lesser cardamom, which are natives of Nepal, grow all over India where cultivated. It is considered the most valuable of all Indian condiments.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 534.

The Annual Report of the Planters' Association of Ceylon for 1906 states that the cardamom crop harvested during the first six months was fully up to expectations, but the unusually wet August and the continuous wet weather from October to the end of the year prevented fructification and retarded the curing of the fruit.—*Chem. & Drug.*, Lond., 1907, v. 70, p. 464.

An abstract (Spice Mill) discusses the origin of cardamom, its medicinal use, its cultivation, and gives some figures as to the area now under cultivation in Ceylon.—*The Spatula*, 1907–8, v. 14, p. 178.

Robin discusses the cultivation of cardamom, the importance of the product, the botany, description, culture, and collection, with some statistics as to the amount produced.—*J. d'Agric. trop.*, Par., 1907, v. 7, pp. 235–237.

Schimmel & Co. (*Semi-Ann. Rep.*, October, 1907, p. 31) point out that when examining Ceylon cardamom oil Wallach found a hydrocarbon (specific gravity 0.864), boiling at 165–167°, which, with glacial acetic, and hydrochloric acid, yielded terpinene dihydrochloride (m. p. 52°).

Stansfield, J. M., questions the need for continuing the compound tincture of cardamom in the U. S. P.—*Proc. Florida Pharm. Ass.*, 1907, p. 9.

CARUM.

Nelson, Burt E., describes and figures the structural characteristics of powdered caraway.—*Merck's Report*, N. Y., 1907, v. 16, p. 38.

CATAPLASMA KAOLINI.

Blair, H. C., discusses the history and the uses of cataplasm of kaolin and concludes that, working with a satisfactory sample of kaolin, the careful drying of the clay and the thorough mixing of the ingredients are the two things that will produce good results.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 184.

An unsigned article reviews the history of the use of glycerin poultices.—*J. Am. M. Ass.*, 1907, v. 48, p. 1875.

Wilbert, M. I., calls attention to the fact that kaolin as found on the market differs widely in chemical and physical properties, and that considerable care is necessary to get a kaolin that gives a satisfactory cataplasm, using the U. S. P. quantities.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 297.

Dawson, Edward S., asserts that the formula for cataplasma kaolini yields a fairly satisfactory product, but the variability of the kaolin furnishes a source of much annoyance.—*Proc. N. Y. Pharm. Ass.*, 1907, p. 221.

An editorial discussing the cataplasm of kaolin expresses the belief that it would be advantageous to mix the kaolin with glycerite of boroglycerin and thus avoid reaction at least between these two substances.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, pp. 187–188.

Stanislaus, I. V. S., discusses the preparation of cataplasm of kaolin and points out some of the precautions that are necessary in making this preparation. He points out that the kaolin should be of a variety known in commerce as "bolted china clay."—*Bull.*

Pharm., 1907, v. 21, pp. 153-154. (See also Proc. Pennsylvania Pharm. Ass., 1907, pp. 154-156.)

Lantz, L. Z., comments on the formula for cataplasm of kaolin and points out that the preparation frequently swells after being prepared according to the official process.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 30.

An editorial, commenting on the above, points out that the reaction complained of is probably brought about by the presence of water either in the glycerin or kaolin, and this should be guarded against.—*Ibid.*, v. 2, p. 30.

Gluck, M., suggests that in the making of cataplasm of kaolin, precautions should be taken that the latter is free from carbonate.—Drug. Circ., N. Y., 1907, v. 51, p. 220.

An editorial calls attention to the use of earth as a dressing as recommended in 1872, and states that clay in the form of kaolin is cleanly, and possibly it has all the advantages of earth as a dressing.—Lancet, Lond., 1907, v. 172, p. 44.

A contributor to the "Pharmacology" column asserts that the clay poultices have probably been exploited with more deception and harm than any other class of preparations excepting acetanilide. The method in which antiphlogistine is exploited is mentioned and the evolution of the official cataplasm is outlined.—J. Am. M. Ass., v. 48, p. 1875.

Tracy, Edward A., advises the use of compound kaolin paste to relieve the pain of synovitis.—N. Y. M. J., 1907, v. 85, p. 360.

CAULOPHYLLUM.

Henkel, Alice, describes and figures *Caulophyllum thalictroides* (L) Michx., commonly known as blue cohosh, caulophyllum, papoose root, squaw root, blueberry root, blue ginseng, yellow ginseng.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 37-38.

Holm, Theo. D., describes and figures *Caulophyllum thalictroides* (L) Michx., also describes and figures the internal structure of the organs of the rhizome, the axis of the inflorescence, the pedicel, and the leaf.—Merck's Report, N. Y., 1907, v. 16, pp. 94-96.

Kinyon, C. B., recommends the use of caulophyllum in diseases of women when the patient is almost frantic or even delirious at times because of the pain. The pains are more sharp and unendurable than in cimicifuga.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 384.

CERA FLAVA.

Frerichs, G., outlines a description for white wax and yellow wax, in which he includes melting point 64°, specific gravity 0.966-0.970 (15° C.), acid number 18.5-24.1, ester number 73-75.8.

The determination of the specific gravity is to be made by melting the wax at a comparatively low temperature, dropping slowly into alcohol. The resulting roundish grains of wax, dried at room temperature for twenty-four hours, should float in diluted alcohol having a specific gravity of 0.971 and should sink in a similar liquid with a specific gravity of 0.965.—Apoth. Ztg. Berl., 1907, v. 22, p. 13.

Bohrisch, P., outlines a proposed monograph for *cera flava* to be included in the coming edition of the Ph. Germ. He suggests a melting point limited to from 63 to 64° C., and outlines a method for determining the same with precision. Also outlines tests for identity and purity.—*Ibid.*, v. 22, p. 5.

Buchner, George, discusses the saponification of wax and takes exception to the recommendations made by Bohrisch that the saponification be conducted with direct heat, for from five to six hours. Buchner asserts that with the observation of certain precautions the process can readily be completed in one hour.—Chem. Ztg., Cöthen, 1907, v. 31, p. 126.

He reports some additional observations on the saponification of wax under various conditions, and concludes that his original one-hour method gives uniformly satisfactory results.—*Ibid.*, v. 31, p. 1085.

The same author reports observations on the behavior of wax with ether at ordinary temperature to determine the solubility of the various constituents of wax in ether.—*Ibid.*, v. 31, p. 570.

Berg., Ragnar, discusses the examination of wax, the various uses to which the substance is being put, and the sources from which it is obtained.—*Ibid.*, v. 31, pp. 537-539.

Holmes, E. M., points out that the name white wax has been applied to the product formed by an insect on the twigs of *Ligustrum lucidum*. This he asserts is incorrect, although the substance referred to is a waxlike body and is unusually white. In appearance it exactly resembles spermaceti, but is much harder, its solidifying point being given by Allen as 80.5° to 81° C. Chemically it consists of ceryl cerotate.—Pharm. J. Lond., 1907, v. 25, p. 500.

Dietrich, Karl, reports the examination of beeswax at various stages of age and development, and points out that the physical as well as the chemical characteristics of wax vary considerably.—Chem. Ztg., Cöthen, 1907, v. 31, pp. 987-988.

Kühl, Hugo, discusses the characteristics of the several waxes and waxlike substances used in medicine and the arts.—Apoth. Ztg., Berl., 1907, v. 22, pp. 1136-1137.

An abstract describes a mechanical bleaching process for beeswax.—Paint, Oil, and Drug Rev., Chicago, 1907, v. 44, December 4, p. 16.

Gausby, R. A., points out that both yellow and white wax are still commonly adulterated. The worst lot examined contained about 50 per cent of paraffin. The usual admixture seems to be paraffin or ceresin to the extent of about 10 per cent, with the addition of sufficient stearic acid to restore the diminished saponification value to normal.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 78.

Blome, Walter H., (com. on adulterations) reports a number of samples of yellow wax having a melting point of 1 or 2° below the U. S. P. minimum. One lot was very dirty.—*Proc. Michigan Pharm. Ass.*, 1907, p. 71.

Barnard, H. E., reports that of the 7 samples of beeswax examined 6 were pure and 1 was adulterated, being almost half paraffin.—*Rep. Indiana Bd. Health*, 1907, p. 199.

Baird, J. W., (com. on adulterations) reports on 15 samples of yellow wax; 11 genuine, 4 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 39.

Lythgoe, Hermann C., reports 2 samples out of 12 examined as being adulterated.—*Rep. Massachusetts Bd. of Health*, 1907–8, p. 385.

Evans Sons Lescher and Webb (*Analytical Notes* 1907–8, p. 7) found 2 white samples of beeswax with an acid value of 13.4, 7.7; saponification value 54.6, 82.6; melting point 57° C., 50° C., and specific gravity 0.944 and 0.935. One yellow sample gave an acid value of 5.0; saponification value, 25.0; melting point, 66° C., and specific gravity of 0.880.

The inspectors of pharmacies found white wax containing paraffin and yellow wax adulterated with ozokerite; they recommend the use of the saponification test.—*Ann. de pharm. Louvain*, 1907, v. 13, p. 277.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 35) reports that only 2 of 25 samples of yellow wax examined indicated adulteration. One contained ceresin and the other a mixture of stearin and ceresin.

Spindler reports 1 sample of yellow wax as being more than 50 per cent paraffin. The acid number of this sample was 8.9 and the ester number was 34.5.—*Suedd. Apoth. Ztg.*, 1907, v. 47, p. 50.

CERA ALBA.

Hankey, W. T., asserts that he has been unable to find white wax that will meet the requirements on melting point, viz., 64 to 65° C. He found the range in melting point in 25 samples to be from 53 to 63.8° C.—*Am. Druggist*, N. Y., 1907, v. 50, p. 9.

Blome, Walter H., (com. on adulterations) reports several samples of white wax adulterated with tallow. When so adulterated it may be bent nearly double before breaking. One sample was very dirty.—*Proc. Michigan Pharm. Ass.*, 1907, p. 71.

Baird, J. W., (com. on adulterations) reports one sample adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 39.

Gilmour, J. P., found paraffin wax present in 9 samples of white wax.—Pharm. J. Lond., 1907, v. 25, p. 109.

CERII OXALAS.

Dohme and Englehardt report two shipments of cerium oxalate containing an undue amount of arsenic.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 379.

Troxell, H. L., (com. on adulterations) found some samples to contain more arsenic than allowed by the U. S. P.—Proc. Maryland Pharm. Ass., 1907, p. 86.

The editor of the "Therapeutics" column quotes H. B. Sheffield's statement that cerium oxalate and tincture of iodine, well diluted, among other substances enumerated, are all useful gastric sedatives.—J. Am. M. Ass., 1907, v. 48, p. 1211.

CETACEUM.

An unsigned article (Southall's Report 1907, 14) reports that the saponification value determined upon 8 samples, in other respects answering the Ph. Brit. requirements, ranged between 122.7 and 129.6.—Year Book Pharm. Lond., 1907, p. 149.

CHIMAPHILA.

Soules, S. G., reports the disappearance of sugar from the urine of a patient who had suffered from diabetes for eight years, in three weeks after beginning treatment with chimaphila. Capsicum and grindelia robusta had been found efficacious in reducing the amount of sugar.—N. Y. M. J., 1907, v. 86, p. 929.

CHLORALFORMAMIDUM.

The Council on Pharmacy and Chemistry states that chloralamid is a name applied to chloralformamidum, U. S. P.—J. Am. M. Ass., 1907, v. 48, p. 421.

CHLORALUM HYDRATUM.

Sayre, L. E., reports determining the melting point of 2 samples of hydrated chloral which he found to be 51° and 52° C., respectively.—Bull. Kansas Bd. Health, 1907, p. 12.

Self, P. A. W., calls attention to the several methods which have been suggested for the assay of hydrated chloral, gives a process devised by Wallis, also his own modification of the Ph. Brit. process.—Pharm. J. Lond., 1907, v. 25, pp. 4-7.

Short, F. W., comments on the assay of chloral hydrate proposed by Self, and calls attention to a method proposed by him about twenty years ago and which he believes to be essentially similar to the one now advocated by Self.—*Ibid.*, v. 25, p. 352.

Covelli, Ercole, reviews the several reactions of hydrated chloral with the phenols, and outlines a reaction which he asserts is characteristic of chloral and depends on the property of this substance to form with fatty oils a greenish blue substance in the presence of strongly hygroscopic materials.—*Chem. Ztg.*, Cöthen, 1907, v. 31, p. 342.

Weston and Ellis discuss the decomposition of chloral hydrate by caustic soda and explain some of the discrepancies in the estimation of the former.—*Chem. News*, Lond., 1907, v. 95, pp. 210–211.

Rosenthaler and Reis report experiments to determine the action of magnesium hydroxide on chloral and chloroform. They conclude that chloroform is not affected and that the decomposition of chloral is dependent on the length of time and the amount of heat employed. The side reactions of chloral with magnesium hydroxide and other hydroxide ions cause the variation in the results obtained in the estimation of chloral by this method.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 678.

Schär, Ed., discusses the use of hydrated chloral, chloral alcoholate and hydrated bromal in chemical, microscopical, and microchemical work.—*Ber. d. pharm. Gesellsch.*, Berl., 1907, v. 17, pp. 407–413.

Mayor, A., reports a comparative study of the action of hydrated chloral and some of the more or less closely related newer remedies.—*Therap. Monatsh.*, Berl., 1907, v. 21, pp. 250–263.

Hausmann, W., refers to the possibility of habituation of the organism to hydrated chloral and points out that doses of from 30 to 40 gms. may be taken by an individual accustomed to this drug.—*Ergeb. d. Physiol.*, 1907, v. 6, p. 94.

Dücker discusses the pharmacodynamic action of various synthetic hypnotics including hydrated chloral.—*Pharm. Ztg.*, Berl., 1907, v. 52, p. 971.

Mansfeld and Fejes report observations on the poisoning of normally fed and fasting animals by means of hydrated chloral.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, pp. 349, 353.

Hatcher, Robert A., criticises the statement made by Impens that isopral is a safer hypnotic than hydrated chloral. (*J. Am. M. Ass.*, 1907, v. 48, pp. 1849–1852.) Additional contributions to this controversy will be found *Ibid.*, v. 49, pp. 1906–1909; 1909–1912; 1922.

CHLOROFORMUM.

White, Edmund, describes chloroform, gives tests for impurities, and discusses the varieties usually met in trade.—*Pharm. J. Lond.*, 1907, v. 25, p. 540.

Dohme and Englehardt think it is to be regretted that the U. S. P. did not include a "Chloroformum pro narcosi" with more stringent requirements for its purity. They point out that the tests given in

the U. S. P. do not exclude phosgen, the substance which, as is generally admitted, causes the undesirable effects of chloroform and has even caused death.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 378.

A news item points out that the new regulations of the United States Internal Revenue Department permit the use of a special denatured alcohol for the production of chloroform, and that, in consequence, the price of chloroform has been materially reduced.—*Pharm. J. Lond.*, 1907, v. 25, p. 367.

van der Harst, J. C., reports on a sample of "Chloral-chloroform," which was suspected because of its producing untoward symptoms. Reactions for foreign halogen combinations and for aldehyde were positive; phosgen was also present.—*Pharm. Weekbl.*, 1907, v. 44, p. 1507.

Breteau and Woog (*Répert. de Pharm.*, 1907, No. 2) find Congo-red a delicate reagent for the detection of hydrochloric acid in chloroform, being available when silver nitrate fails.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 895.

Blome, Walter H. (com. on adulterations), reports that quite a large number of samples of chloroform proved to be of uniformly good quality. Only one contained any impurity and that but a trace.—*Proc. Michigan Pharm. Ass.*, 1907, p. 67.

Caldwell, Paul, says that 1 ounce of chloroform anodyne contains 1 dram of chloroform, 9 grains of cannabis indica, 1½ grains of morphine sulphate, 15 minims of ether, and 62 per cent of alcohol.—*Drug. Circ. N. Y.*, 1907, v. 51, p. 204.

Buckmaster and Gardner report on the estimation of chloroform in the blood of anæsthetized animals, giving comparative results by their own and by Nicloux's method.—*Proc. Roy. Soc. Lond.*, 1907, v. 79, pp. 309–315. (See also *Ibid.*, v. 79, pp. 555–565; 566–579; 579–589.)

Frison and Nicloux report on the quantities of chloroform fixed by the gray and white matter of the brain at the moment of death by this anæsthetic.—*Comp. rend. Soc. de biol. Par.*, 1907, v. 62, pp. 1153–1154; v. 63, pp. 220–222.

Nicloux, Maurice, suggests a modification of his method of estimating small quantities of chloroform in the blood and the tissues with the view of increasing the sensitiveness of the test.—*Ibid.*, v. 63, pp. 391–392.

Polimanti, Osvaldo, discusses the behavior of the blood pressure and respiration in acute chloroform intoxication.—*Arch. farmacol. sper. Roma*, 1907, v. 6, pp. 251–253.

Ballmer, E. A., discusses the use of chloroform in obstetrics.—*Eclectic M. J.*, Cincin., 1907, v. 67, pp. 669–672.

Additional references on the use of chloroform will be found in the *Index Medicus* and the *J. Am. M. Ass.*

CHONDRUS.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 27) detected distinct arsenical contaminations in two lots of Irish moss, after igniting with lime. This is caused, no doubt, by impurities in the sulphur used for bleaching the article.

CHROMII TRIOXIDUM.

White, Edmund, describes chromic acid, gives tests for purity, discusses the available trade varieties, and points out that the chromic acid used as a reagent should be free from sulphate and potassium salts.—Pharm. J. Lond., 1907, v. 25, p. 541.

Wallis, T. E., reports an examination of chromic anhydride and its solutions, and presents a number of suggestions relative to the practical bearing of this investigation upon the Ph. Brit. requirements.—*Ibid.*, 1907, v. 25, pp. 112–113.

Alcock, F. H., discusses a test for salts of chromium by oxidation with sodium peroxide.—*Ibid.*, v. 25, p. 211.

Bennett, C. T., outlines a method for the determination of chromic anhydride, which depends on the liberation of iodine from potassium iodide.—*Ibid.*, v. 25, p. 204.

Caspari, Chas. E., (com. on adulterations) examined 4 samples of chromic acid; none U. S. P.; all contained sulphuric acid.—Proc. Missouri Pharm. Ass., 1907, p. 144.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 16) assert that the "commercial" quality contains as a rule from 54 to 60 per cent CrO_3 , and the "pure" about 98 per cent. Even the latter hardly answers the strict test for sulphuric acid of most pharmacopœias.

CHRYSAROBINUM.

Alvarez, E. Pinerua, describes a color reaction for chrysarobin with hydrate of sodium dioxide, pure ethyl alcohol and cold water.—Ann. de chim. analyt. Par., 1907, v. 12, p. 9.

The editor of the Therapeutics column states that chrysarobin is one of the best remedies for alopecia.—J. Am. M. Ass., 1907, v. 48, p. 1210.

Winkler, M., (Cor. Bl. f. schweiz. Aerzte, v. 27, No. 18) states that chrysarobin is not excreted by the kidney except to a very limited extent, hence there is little danger of nephritis from its use.—*Ibid.*, v. 49, p. 1726.

CIMICIFUGA.

Henkel, Alice, describes and figures *Cimicifuga racemosa* L, Nutt., also known as black snakeroot, bugbane, bugwort, rattle-snake root, rattleroot, rattleweed, rattletop, richweed, and squawroot.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1907, No. 107, pp. 35–36.

Gane, E. H., points out that *cimicifuga* yields from 9 to 12 per cent of extractive to the official menstruum, and that the resulting fluid extract contains approximately 82.82 per cent by weight or 87.8 per cent by volume of absolute alcohol. Distilled, 72.4 per cent by volume.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 319.

Kinyon, C. B., characterizes *cimicifuga* as another uterine polycryst and asserts that it is perhaps more frequently called for in dysmenorrhœa than any other remedy in the *materia medica*.—*Tr. Am. Inst. Homœop.*, 1907, 63rd session, p. 385.

CINCHONA.

"Xrayser" discusses the discovery of cinchona and points out that there is much probability that the Jesuits really discovered its medicinal value.—*Chem. & Drug.*, Lond., 1907, v. 70, p. 191.

Gehe & Co. (*Handels-Bericht*, 1907, pp. 19-22) discuss the economic conditions prevailing in the cinchona market and give the export of cinchona from Java for 1906 as 6,758,000 kilo; also give figures relating to the production of cinchona and the sale of the bark on the Amsterdam and London markets.

A special correspondent discusses the cultivation of cinchona in Java, and asserts that only about 25,000 acres of land are planted in cinchona trees, and most of this acreage is on the hills around or near Bandoeng, where the quinine factory is located.—*Oil, Paint, and Drug Reporter*, New York, 1907, v. 71, June 24, pp. 29-30.

Perrot and Goris discuss the cultivation of cinchona in the French colonies.—*Bull. de sc. pharmacol. Par.*, 1907, v. 14, pp. 529-536.

V. Leersum, G., (*Ber. Omtrent de Gouvernements Kina-onderneming*, 4e Kwartaal, 1907) reports experiments made in the Dutch governmental laboratories and which have resulted in some highly interesting observations concerning the ontogenesis of the cinchona alkaloids.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 213.

Rohde and Antonaz present a contribution to our knowledge of cinchona alkaloids.—*Ber. d. deutsch. chem. Gesellsch. Berl.*, 1907, v. 40, pp. 2329-2338.

See also paper by Rabe, *Ibid.*, pp. 3655-3658.

Kwisda, A., reviews the advances made in the chemistry of the cinchona alkaloids during the year 1906.—*Pharm. Post*, Wien, 1907, v. 40, p. 154.

Puckner, W. A., reviews the 1906 literature relating to the estimation of alkaloids in cinchona.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, pp. 309-312.

Kebler, Lyman F., found the several experimenters to agree fairly well in their assays of red cinchona, the maximum variation being with ether soluble alkaloids, using the U. S. P. methods where the results vary from 2.86 per cent to 4.27 per cent, a difference of 1.41.—

Proc. Ass. Off. Agric. Chem., 1907, 24th Ann. Conv., p. 81. (Bull. Bur. Chem. U. S. Dept. Agric. 1908, No. 116.)

Dohme and Englehardt point out that the assay method for cinchona could be considerably improved, and suggest a method which yields about 1 per cent more of alkaloids than the U. S. P. method.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 379.

Focke, G., discusses the several modifications for the assay of cinchona that have been proposed during the past year.—Geschäfts Ber. v. Caesar and Loretz in Halle, 1907, pp. 14–17. (See also *Ibid.*, pp. 81–83.)

Rupp and Seegers discuss the availability of the several well-known indicators in the titration of cinchona alkaloids, point out that iodeosin is not available, and assert that hæmatoxylon may satisfactorily be substituted by dinitrophenolphthalein or, better still, by p-nitrophenol, in all cases where a colorless or nearly colorless liquid is used.—Apoth.-Ztg. Berl., 1907, v. 22, pp. 748–750.

Knöpfer, Gustav, discusses quinic acid and reports some observations on the decomposition products that he has studied and which were not mentioned by Echtermier in the paper published in this journal, in 1905.—Arch. d. Pharm., 1907, v. 245, pp. 77–80.

An abstract from Pharm. Zeit., 1907, 52, 943, outlines a method for the determination of cinchona tannates and alkaloids in cinchona bark.—Pharm. J. Lond., 1907, v. 25, p. 849.

Philipp Röder Wien, criticises the Ph. Austr. VIII assay process for cinchona and asserts that the results obtained are not reliable.—Ztschr. d. allg. österr. Apoth.-Ver., 1907, v. 45, p. 254.

Troxell, H. L., (com. on adulterations) points out that many samples of the bark run low in alkaloids, due most likely to the fact that high-grade barks are used by the manufacturers of quinine.—Proc. Maryland Pharm. Ass., 1907, p. 86.

Vanderkleed, Charles E., reports 38 assays of cinchona bark ranging from 1.530 to 10.700 per cent. He points out that appearance is no indication of value.—Proc. Pennsylvania Pharm. Ass., 1907, p. 87.

Blome, Walter H., (com. on adulterations) reports that cinchonas occasionally assay low.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Sayre, L. E., reports on 14 assays of commercial cinchona bark, which yielded from 3.6 to 10 per cent of anhydrous cinchona alkaloids. Average 6.19 per cent.—Bull. Kansas Bd. Health, 1907, p. 43.

Patch, E. L., reports an examination of 14 samples varying from 3.02 per cent to 9.56 total, and from 2.56 per cent to 6.3 per cent ether soluble alkaloids.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

Spindler reports a sample of cinchona bark containing but 2.93 per cent of alkaloids and cautions against the purchase of powdered cinchona.—Suedd. Apoth., Ztg., 1907, v. 47, p. 50.

The inspectors of pharmacies point out that because of the variety of species cinchona bark is extremely variable. They have found bark with little or no alkaloid while other samples contained as much as 7 or 8 per cent.—*Ann. de pharm. Louvain*, 1907, v. 13, p. 277.

Niece, Frederic E., outlines a color reaction for testing the identity of tincture of cinchona.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 481-482.

Dohme and Englehardt point out that the menstruum used by the U. S. P. for extracting cinchona does not exhaust the drug. They find that diluted hydrochloric acid extracts about 15 per cent more of the alkaloids than the official menstruum and assert that the extract has a better appearance than the fluid extract U. S. P.—*Ibid.*, v. 55, p. 380.

Dulière, W., outlines a method for applying Meyer's reagent for the rapid determination of alkaloids in fluid extract of cinchona.—*Ann. de pharm. Louvain*, 1907, v. 13, pp. 51-52.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907-8, p. 16) assert that the official assay method fails entirely with some samples of this extract, which readily forms a thick emulsion after a very slight amount of agitation. In cases of this kind they have secured good results by evaporating with sand on a water bath and thoroughly extracting the residue with chloroform and ammonia.

Kinyon, C. B., recommends the use of china for too early and too profuse menstruation. Menses frequently suppressed from disappointment or chagrin.—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 384.

CINCHONA RUBRA.

Gausby, R. A., reports on a sample of powdered red cinchona bark which proved on assay to contain only 1.30 per cent of total alkaloids.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 74.

Sayre, L. E., reports on the examination of 16 samples of red cinchona which yielded from 4.2 to 9 per cent of alkaloid; average 6.62 per cent.—*Bull. Kansas Bd. Health*, 1907, p. 43.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 40) points out that commercial cinchona is very variable. In 21 samples of cinchona rubra the ash varied from 1.95 per cent to 6.39 per cent and the alkaloidal content from 1.38 to 7 per cent.

Alcock, F. H., outlines characteristics for tincture of cinchona and for compound tincture of cinchona.—*Pharm. J. Lond.*, 1907, v. 25, p. 738.

CINCHONIDINÆ SULPHAS.

Thurston, Azor, asserts that cinchonidine sulphate is laevorotatory in aqueous solution.—*Merck's Report*. N. Y., 1907, v. 16, p. 124.

Blome, Walter H., (com. on adulterations) reports that nearly all samples require more than the amount of water allowed by the

Pharmacopœia for solution.—Proc. Michigan Pharm. Ass., 1907, p. 67.

CINCHONINÆ SULPHAS.

Gordin, H. M., comments on the progress in the chemistry of cinchonine during the year 1906.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 261.

Raube and Ackermann report some observations on the action of nitric acid on cinchonine and the production of various oxidation products.—Ber. d. deutsch. chem. Gesellsch. Berl., 1907, v. 40, pp. 2016–2017.

Rabe, Paul, discusses the production of a new oxidation product of cinchonine and reports a number of experiments.—*Ibid.*, v. 40, III, pp. 3655–3658.

Blome, Walter H., (com. on adulterations) reports that samples of cinchonine sulphate contained excess of quinine and quinidine.—Proc. Michigan Pharm. Ass., 1907, p. 68.

CINNAMOMUM SAIGONICUM.

Rosenthaler, L., (Festschr. z. Einweihung d. neuen. pharm. Inst. d. Un. Straszburg, 1906) describes Saigon cinnamon. He gives the ash content as being 2.93 per cent, the water content 15.69 per cent and the volatile oil content 2.11 per cent.—Apoth. Ztg. Berl., 1907, v. 22, p. 47.

Hendrick, James, reports observations on the amount of calcium oxalate in cinnamon and cassia barks; he also presents a table giving the ash and the constituents of the ash found in these barks.—Analyst, London, 1907, v. 32, pp. 14–16.

McGill and Lemoine (Lab. Inland Rev. Dept. Canada, Bul. 138, p. 7) includes data on the examination of 33 samples of ground cinnamon and a discussion of the results with reference to standards.—Exp. Sta. Rec., 1907–8, v. 19, p. 1062.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, p. 26) point out that Rosenthaler concludes that Saigon cinnamon originates, if not from *Cinnamomum cassia* Bl. itself, at least from a very closely allied species. The bark contains about 2.1 per cent essential oil and has a very fine odor and taste.

CINNAMOMUM ZEYLANICUM.

Alcock, F. H., discusses the per cent of extract in tincture of cinnamon and points out that the results obtained by him are somewhat lower than those reported by Gadd, Umney, and others. He found that the total solids varied from 1.9 per cent to 2.1 per cent and believes that it will therefore be necessary to look to other data for the confirmation of the genuineness of a sample of tincture of cinnamon.—Pharm. J. Lond., 1907, v. 24, p. 746.

COCA.

An unsigned abstract points out that the production of coca leaves in Perené, Peru, is estimated at 200 quintals, of which 50 have been consumed in the district and 150 exported to Jauja and Huancayo, and that the average price throughout the year has been 9 soles (18s.) per arroba of 25 lbs.—Merck's Report, N. Y., 1907, v. 16, p. 67.

Hemsley, W. B., (Kew Bulletin, 1907, p. 136) describes a plant, known in Peru as *tampus*, which is used like coca. Holmes has identified the plant as *Werneria dactophylla*, a genus of high level *Compositae*, almost or perhaps quite peculiar to the Andes.—Bot. Centralbl., 1907, v. 105, p. 640.

Kwisda, A., reviews the progress made in the chemistry of the coca alkaloids during the year 1906.—Pharm. Post, Wien, 1907, v. 40, p. 181.

Puckner, W. A., reviews the literature relating to the estimation of cocaine, published during the year 1906.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 312.

Kebler, Lyman F., asserts that the results of assay by all methods are so variable that none can be said to be encouraging. The results that he presents indicate that the aliquot part gravimetric method gives rather more co-relating results than do the other methods that were tried.—Proc. Ass. Off. Agric. Chem., 1907, 24th Ann. Conv., p. 81. (Bull. Bur. Chem., U. S. Dept. Agric., 1908, No. 116.)

Cæsar and Loretz (Geschäfts Ber., 1907, p. 92) suggest the determination of the moisture content of coca leaves as well as of the alkaloid, and discuss an assay process, using ether as the solvent.

Greshoff, M., discusses the determination of ecgonine in Java coca.—Pharm. Weekbl., 1907, v. 44, pp. 961-963.

Dohme and Englehardt report that they have had no difficulty in obtaining leaves assaying as high as 0.8 to 0.9 per cent of ether-soluble alkaloids.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 379.

Sayre, L. E., reports on 16 samples of commercial coca leaves which were found to contain from 0.35 to 0.98 per cent of alkaloid. Average 0.61 per cent.—Bull. Kansas Bd. Health, 1907, p. 43.

Troxell, H. L., (com. on adulterations) found one sample (for purchasing) to contain 1.8 per cent cocaine, but was apparently dipped in a cocaine solution.—Proc. Maryland Pharm. Ass., 1907, p. 86.

Vanderkleed, Charles E., (com. on adulterations) reports 16 assays of coca leaf ranging from 0.450 to 1.000 per cent. Truxillo leaf was found to assay generally higher than the Huanuco variety.—Proc. Pennsylvania Pharm. Ass., 1907, p. 88.

Blome, Walter H., (com. on adulterations) reports that coca leaves frequently assay a bit high.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Graham, Willard, examined 3 samples of coca leaves which contained respectively 0.4, 0.55, and 0.77 per cent of ether-soluble alkaloids.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 237.

Gane, E. H., examined 3 lots ranging from 0.70 per cent to 1.02 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 324.

Patch, E. L., reports 5 lots examined containing from 0.61 per cent to 1.59 per cent.—*Ibid.*, v. 55, p. 324.

Dohme, A. R. L., reports that coca leaves, and also the several galenical preparations of coca, depreciate in cocaine content very markedly, a loss of ash as much as 50 per cent having been noted.—*D.-A., Apoth.-Ztg.*, N. Y., 1907, v. 28, p. 133.

Caldwell, Paul, points out that one ounce of aromatic wine of coca contains $\frac{1}{8}$ grain of cocaine and 19 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 205.

COCAINE.

Gehe & Co. (*Handels-Bericht*, 1907, p. 68) discuss the market conditions for cocaine and present statistics showing the amount of crude cocaine available in the London market January 1st as being 1,900 kilos, the amount disposed of during the year being 5,859 kilos.

Gordin, H. M., reviews the literature bearing on the progress in the chemistry of cocaine made during the year 1906.—*Pharm. Rev. Milwaukee*, 1907, v. 25, p. 265.

Reichard, C., discusses the cause for the fluorescence of cocaine and tropacocaine and believes this to be due to the contained benzoyl radicle.—*Pharm. Ztg.*, Berl., 1907, v. 52, pp. 698–699.

Thurston, Azor, asserts that cocaine is dextrogyrate.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

Pozzi-Escot, Emm., describes a double iodide of bismuth and cocaine which, it is claimed, offers a good microchemical test for the latter.—*Ann. de chim. analyt.*, Par., 1907, v. 12, p. 358.

Liebermann, C., discusses the utilization of secondary alkaloids of coca and the possible occurrence of decomposition products.—*Ber. d. deutsch. chem. Gesellsch.*, 1907, v. 40, III, pp. 3602–3603.

Schulz, K. (*Pharm. Zeitschr. für Russland*, 1907, p. 165), points out that large crystals of cocaine are usually purer than small crystals or granules. He recommends the MacLagan test for purity and the presence of isotropyl cocaine.—*Schweiz. Wehnschr. f. Chem. u. Pharm.*, Zürich, 1907, v. 45, p. 391.

An editorial reviews the history of the origin and uses of cocaine, and points out the need for restrictive legislation.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 709.

Dohme, A. R. L., reviews the causes that have contributed to the reduction of the price of cocaine. One of the more evident reasons

he believes to be the regulations restricting the sale of this drug.—D.-A., Apoth.-Ztg., N. Y., 1907, v. 28, p. 133.

Rogée, H., discusses the nature and the use of local anesthetics and their comparative usefulness.—Pharm. Zentralh., 1907, v. 48, pp. 201-205.

Winzheimer, E., discusses the chemistry of the newer local anesthetics, their origin and their relation to cholin, as well as their chemical relation to cocaine and ecgonin.—Riedel's Berichte, Berlin, 1907, pp. 9-25.

Spiegel, L., reviews the chemistry and the uses of some of the newer local anesthetics as compared with cocaine.—Chem. Ztg., Cöthen, 1907, v. 31, pp. 323-324.

Caldwell, Paul, says that each cocaine pencil contains $1\frac{1}{2}$ grains of cocaine.—Drug. Circ., N. Y., 1907, v. 51, p. 205.

Hausmann, W., points out that the habituation of the animal organism to cocaine has led to the great prevalence of the cocaine habit. Persons readily acquire the possibility of taking huge doses of this drug.—Ergeb. d. Physiol., 1907, v. 6, pp. 99-100.

MacDonald, Val. discusses the use of cocaine-adrenalin anesthesia in dental operations.—Dental Cosmos, Phila., 1907, v. 49, pp. 555-559.

Vaillard (Arch. de Stomatol. Par. Nov., 1906) discusses the futility and danger of treating cocaine poisoning with morphine.—Abstr. in *Ibid.*, v. 49, p. 413.

Cornet, M. (Rev. Hebdom. de Laryng. d'Otol. et de Rhinol.), believes that better results can be obtained by the use of alcoholic solutions of cocaine hydrochlorate than by the employment of the watery solutions usually applied. He asserts that the alcoholic solution acts more rapidly and the burning sensation from the application disappears in a certain time, indicating that the anesthesia is completed.—Hahnemann. Month., Phila., 1907, v. 42, p. 69.

Additional references on the use of cocaine will be found in the Index Medicus and the J. Am. M. Ass.

COCAINÆ HYDROCHLORIDUM.

Murray, Benjamin L., discusses the U. S. P. melting point for cocaine hydrochloride, asserts that the real melting point for the official article should be given, and suggests 180° to 183° C.—Merck's Report, N. Y., 1907, v. 16, p. 249.

Riedel's Berichte (Berlin, 1907, p. 64) discusses the characteristics of cocaine picrate obtained by precipitation from a dilute solution of cocaine hydrochloride and suggests the possibility of using the melting point of the resulting product and the crystalline structure as a means for recognizing cocaine.

Blome, Walter H. (com. on adulterations), reports cocaine hydrochloride with the melting point 181° C., and calls attention to the fact that the U. S. P. states that "Minute quantities of impurities may reduce the melting point to 180° or less."—Proc. Michigan Pharm. Ass., 1907, p. 68.

Vanderkleed, Charles E. (com. on adulterations), reports on one sample of cocaine hydrochloride which contained isotropylcocaine.—Proc. Pennsylvania Pharm. Ass., 1907, p. 84.

The inspectors of pharmacies report finding cocaine hydrochloride having 2 molecules of water of crystallization in place of the anhydrous salt prescribed by the pharmacopœia.—Ann. de pharm. Louvain, 1907, v. 13, p. 326.

Dean, H. P. (Brit. M. J., Oct. 5), discusses inhalation and injection anesthesia, and states that the principal objection to lumbar anesthesia lies in the poisonous and treacherous character of cocaine. He states that the whole method of lumbar anesthesia stands or falls by its ability to protect the patient from surgical shock, and our knowledge of this requires immediate codification.—J. Am. M. Ass., 1907, v. 49, p. 1559.

COCCUS.

Sage, C. J., reports some observations on cochineal cultivation as carried on in the Canary Islands.—Merck's Report, N. Y., 1907, v. 16, pp. 283-284.

Blome, Walter H. (com. on adulterations), reports that a sample of cochineal, silvered, left 24.36 per cent of ash.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Gane, E. H., reports the examination of 3 samples of cochineal; 1 gray, which assayed 8.81 per cent, 9.41 per cent ash content; 1 silver, 25 to 35 per cent ash, and the other black, 7 per cent ash content. One sample of fine appearance was clearly weighted with black sand, 20 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 325.

Patch, E. L., examined 3 samples which varied from 4.4 per cent to 5 per cent in ash content.—*Ibid.*, v. 55, p. 325.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 80) point out that cochineal should be examined for (1) moisture content; (2) ash content; (3) tinctorial power. They outline a method for determining the latter factor. The ash content is limited by the Ph. Germ. to 5, Ph. Helv. 6, and the U. S. P. 6 per cent.

CODEINA.

Warren and Weiss discuss the use of picrolonic acid as a precipitant for codeine, and describe and figure codeine picrolonate.—Journ. Biol. Chem., N. Y., 1907, v. 3, p. 336. (See also paper by

Matthes and Rammstedt, *Ztschr. f. anal. Chem.*, Wiesb., 1907, v. 46, p. 572.)

Thurston, Azor, asserts that codeine sulphate is lævogyrate in aqueous solution.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Knorr and several collaborators present a number of communications on the chemistry of codeine.—*Ber. d. deutsch. chem. Gesellsch.*, 1907, v. 40, III, pp. 3341–3355; 3355–3358; 3844–3851; 3860–3868; 4889–4892.

Vinci, Gaetano, reports a series of experiments to determine the action of codeine.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, pp. 21–29.

For additional references on the use of codeine see the Index Medicus.

COLCHICI CORMUS.

Kebler, Lyman F., points out that the results of assay by the U. S. P. method are materially higher than the results obtained by an alternate method. By the U. S. P. method the results varied from 0.290 to 0.454 per cent and by the alternate method from 0.280 to 0.298 per cent.—*Proc. Ass. Off. Agric. Chem.*, 1907, 24th Ann. Conv., p. 85. (*Bull. Bur. Chem.*, U. S. Dept. Agric., 1908, No. 116.)

Vanderkleed, Charles E., (com. on adulterations) reports 12 assays of colchicum corm ranging from 0.334 to 0.500 per cent.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 88.

Gane, E. H., reports the examination of 6 lots which assayed from 0.2 to 0.47 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 325.

Sayre, L. E., examined 18 samples of colchicum root assaying from 0.3 to 0.74 per cent of alkaloids. Average 0.49.—*Bull. Kansas Bd. Health*, 1907, p. 44.

COLCHICI SEMEN.

Remington, Joseph P., reports that the U. S. P. standard for colchicum seed is *now* 0.45 per cent of colchicine. Fluid extract of colchicum seed *now* 0.4 gramme alkaloid in 100 cc., tincture of colchicum seed *now* 0.04 gramme alkaloid in 100 cc.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 135.

Puckner, W. A., reviews the literature of 1906 relating to the assay of colchicum.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 322.

Kebler, Lyman F., points out that a series of comparative experiments in the assay of colchicum seed showed great variations in the final results. Attempts to purify the residues indicate that the results would be unreliable. The resulting figures for the unpurified residue varied from 0.642 to 1.044 per cent by the U. S. P. method and from 0.496 to 1.190 per cent by an alternate method.—

Proc. Ass. Off. Agric. Chem., 1907, 24th Ann. Conv., p. 87. (Bull. Bur. Chem., U. S. Dept. Agric., 1908, No. 116.)

Caesar and Loretz (Geschäfts Ber., 1907, p. 51) point out that in the assay for colchicum seed the U. S. P. departs from the general practice of percolation and permits the use of aliquot parts. Also assert that the method proposed by Panchaud (Schweiz. Wochenschr. f. Chem. u. Ph., 1906, p. 563) is more practical than the U. S. P. method.

Vanderkleed, Chas. E., (com. on adulterations) reports 4 assays of colchicum seed ranging from 0.280 to 0.800 per cent. Quality very good. He sees no good reason for reducing standard from 0.55 to 0.45.—Proc. Pennsylvania Pharm. Ass., 1907, p. 88.

Gane, E. H., examined 4 samples which ranged from 0.40 per cent to 0.51 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 325.

Sayre, L. E., reports 11 assays of commercial samples of colchicum seed which contained from 0.32 to 0.8 per cent of alkaloid. Average 0.57 per cent.—Bull. Kansas Bd. Health, 1907, p. 44.

Dawson, Edward S., recommends removing the fixed oil with petroleum benzin, in making the fluid extract of colchicum seed.—Proc. N. Y. Pharm. Ass., 1907, pp. 223–224.

Niece, Frederic E., outlines a color reaction test for the identity of tincture of colchicum and suggests extract content and qualitative test for active principle.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 482.

Adams, E. O., recommends colchicum for rheumatic and gouty diathesis with aversion to the sight or smell of food.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 369.

COLCHICINA.

Dohme and Englehardt assert that the solubility of colchicine, 1:22 in water, could be reduced as an alkaloid which is soluble 1:12 can easily be made.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 379.

Coleman, C. J., reports experiments to determine the influence of injections of colchicine on leucocytosis and the possible influence of leucocytosis on the coagulation time of the blood. He concludes that although the time of coagulation increases synchronously with the leucocytosis, this increase is not strictly proportional.—Biochem. J. Liverpool, 1907, v. 2, pp. 194–198.

COLLODIUM.

Guttman, Oscar, reviews the chemistry of the production of pyroxylin and criticises Lunge's hypothesis of the composition of this article.—Ztschr. f. ang. Chem., Berl., 1907, v. 20, pp. 262–264.

Scoville, W. L., points out that collodion varies considerably in strength, due probably to the variation in quality of pyroxylin used.

Some was one-fourth to one-half per cent above the standard; some 1 per cent or more below.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 325.

The inspectors of pharmacies assert that collodion is frequently not well preserved. They found samples that had been prepared with cotton insufficiently nitrated and partially gelatinized.—Ann. de pharm. Louvain, 1907, v. 13, p. 331.

Caldwell, Paul, asserts that 1 ounce of iodized collodion contains 330 minims of ether and 23 per cent of alcohol; 1 ounce of iodoform collodion contains 330 minims of ether and 23 per cent of alcohol; 1 ounce of corn collodion contains $9\frac{1}{2}$ grains of extract of cannabis indica, 300 minims of ether, and 31 per cent of alcohol. One ounce of croton oil collodion contains 300 minims of ether and 21 per cent of alcohol.—Drug. Circ. N. Y., 1907, v. 51, p. 204.

COLOCYNTHIS.

Nelson, Burt E., describes and figures the structural characteristics of colocynthis.—Merck's Report, N. Y., 1907, v. 16, p. 162.

Tunmann discusses the structural characteristics of colocynth seed and the probable influence of this structure on germination. He expresses the belief that colocynth seed does not contain medicinally active constituents.—Suedd. Apoth. Ztg., 1907, v. 47, pp. 503-505.

Naylor and Chappel describe an examination of *Cucumis trigonus* and also report some additional observations on the properties of an authentic specimen of colocynthin. They conclude that the principle obtained from *Cucumis trigonus* is identical with colocynthin of *Citrullus colocynthis*.—Pharm. J., Lond., 1907, v. 25, pp. 117-118.

Hooper, David, points out that the isolation of colocynthin from *C. trigonus* was reported in 1890, and adds that colocynthin appears to be widely distributed in plants of the Cucurbitaceæ.—*Ibid.*, v. 25, p. 501.

Gilmour, J. P., reports 2 out of 5 samples of colocynth pulp not up to Ph. Brit. requirements; largely admixed with starch.—Year Book Pharm., Lond., 1907, pp. 446-455.

Barton, Charles N., relates that a woman took two teaspoonfuls of powdered colocynth, which resulted in vomiting and purging, but there was no collapse and no blood in the vomit or stools.—Brit. M. J., 1907, v. 1, p. 1364.

Butler, T. Langdon, relates the circumstances of a case of poisoning with bitter apple. There was vomiting and purging, but no effect on the uterus, though pregnancy of three months' duration existed.—*Ibid.*, v. 1, p. 1537.

Bloyer thinks the value of this drug as a pain-relieving agent is not sufficiently recognized; he considers it a specific for the relief of cramping pains or spasms of the unstripped muscular fiber for organic pain; it matters not in what organ the distress occurs.—Eclectic M. J., Cincin., 1907, v. 67, p. 61.

CONIUM.

Nelson, Burt E., describes and figures the structural characteristics of conium.—Merck's Report, N. Y., 1907, v. 16, p. 162.

Gane, E. H., reports that the U. S. P. assay for conium according to H. M. Gordin is complicated and will hardly give concordant results. As yet no satisfactory modification has been devised.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 316.

Gordin, H. M., reviews the progress made in the chemistry of coniine during the year 1906.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 323.

Vanderkleed, Chas. E., reports 8 assays of conium seed ranging from 0.470 to 0.778 per cent.—Proc. Pennsylvania Pharm. Ass., 1907, p. 88.

Sayre, L. E., examined 14 samples of conium fruit which assayed from 0.40 to 0.91 per cent of alkaloid coniine. Average, 0.61 per cent.—Bull. Kansas Bd. Health, 1907, p. 44.

Blome, Walter H., (com. on adulterations) reports that conium fruit always assays high.—Proc. Michigan Pharm. Ass., 1907, p. 68.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of conium as 48.9, 47, 45, 40, and 75 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

Lamic (Arch. méd. d. Toulouse, 1/VI/07) thinks the toxicity of *Conium maculatum* has been greatly exaggerated.—Répert de pharm., Par., 1907, v. 19, p. 308.

Kinyon, C. B., asserts that conium has uses similar to cocculus, except that it has labor-like, bearing-down pains at the time of the flow. Burning soreness and aching pain in the uterus.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 385.

Fornias, Eduardo, asserts that conium is a well-recognized remedy for orchitis from contusion, as well as for induration.—Hahnemann. Month., Phila., 1907, v. 42, p. 585.

CONVALLARIA.

Lenneker, William, reports some observations on the therapeutic action of convallaria and points out a number of indications for this drug which he asserts "is one of the best tonics for the stomach we have. It gives tone to the stomach, increases the appetite, and, what is more, exerts a tonic effect upon the intestinal mucosa, increasing the action of the bowels in a great many people."—Therap. Gaz., Detroit, 1907, v. 31, pp. 616-617.

Schram, Charles, states that *Convallaria majalis* should be tried in neurotic types of myocarditis.—N. Y. M. J., 1907, v. 86, p. 593.

COPAIBA.

Mitchell, Edward, asserts that balsam of copaiba is one of the most difficult items for a druggist to know is pure. The present Pharmacopœia cuts out the brown or Central American variety, as under the requirements yellow or brownish-yellow color is specified.—Proc. Arkansas Pharm. Ass., 1907, p. 89.

Parry, Ernest J., points out that an enormous amount of adulteration of copaiba is being practiced at the present time. He reviews the several tests that have been proposed for the detection of gurjun balsam, *Hardwickia* balsam, and other adulterants.—Chem. & Drug., Lond., 1907, v. 71, p. 518.

An editorial points out that the present high prices of copaiba are largely due to the new stringent requirements of the U. S. A. pure food and drugs act, and also to some extent to the higher price of rubber, which attracts collectors from the cheaper article in Central America.—*Ibid.*, v. 40, p. 521.

Gane, E. H., states that since the first of the year the quality of copaiba has steadily improved. Prior to that time it was difficult to obtain a straight article. Large quantities of spurious goods come from London and Hamburg. Even now admixture with African balsam is common, although on therapeutic grounds little exception could be taken to this admixture.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 325.

Hooper, David, discusses balsam of *Hardwickia pinnata*, describes its origin, history, and its introduction into medicine; also gives the various constants and points out that the oleo-resin is sufficiently distinct in its characters to prevent any confusion being made between it and copaiba or gurjun balsams.—Pharm. J., Lond., 1907, v. 24, pp. 4-5.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 76) discuss the properties of and the tests for copaiba, and point out that the several pharmacopœias differ somewhat in their requirements. The specific gravity is reported by them as being: Ph. Germ. 0.980-0.990; Ph. Belg. 0.94-0.99; Ph. Ndl. 0.94-0.99; Ph. Jap. 0.94-0.99; Ph. Austr. 0.94-0.99; Ph. Helv. at least, 0.96; Ph. Svec. 0.94-0.99; and U. S. P. 0.95-0.995.

Philipp Röder asserts that the acid and saponification number of true copaiba varies to such an extent that these factors can not be relied on as an indication of the identity or purity of the drug.—Pharm. Post., Wien, 1907, v. 40, p. 323.

Vanderkleed and Lynch discuss the U. S. P. test for gurjun balsam in copaiba and present a modification of the nitric-acid test.—Proc. Pennsylvania Pharm. Ass., 1907, pp. 105-107.

Walbaum, L. E., discusses the detection of rosin in copaiba and records, in tabular form, his experiments with the ammonia test as

usually carried out. He points out that a colorimetric test which depends on the reddish-brown compound resulting from the combination of ammonia with rosin is much more sensitive than the usual gelatinization test.—*Pharm. Zentralh.*, 1907, v. 48, pp. 437-445. (See also *Arch. f. Pharm. og. Chem.*)

Dohme and Englehardt think it is to be regretted that there is no reliable test for rosin in copaiba and call attention to an article by L. E. Walbaum on this subject.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 379.

Gausby, R. A., points out that it is very difficult to get a satisfactory quality of copaiba balsam. The usual adulterants are mineral oil and gurjun balsam. In an appended table he gives the results of an examination of a number of samples.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 76.

Troxell, H. L. (com. on adulterations), found a few samples to contain an excess of gurjun balsam.—*Proc. Maryland Pharm. Ass.*, 1907, p. 86.

Vanderkleed, Turner, and Lynch report on several samples of copaiba adulterated with gurjun balsam, and point out that adulterations with petroleum oil have been reported, but that none were observed.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 84.

Blome, Walter H., (com. on adulterations) reports on 2 samples of copaiba that were off in specific gravity, low in acid resins, and showed presence of neutral oils. According to the amended tests, commercial samples do not show presence of gurjun balsam, whereas formerly they quite frequently responded to the tests for this substance.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Caspari, Chas. E., (com. on adulterations) examined 19 samples; 14 satisfactory, 5 contained gurjun balsam.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

Francis, J. M., reports on 2 samples of copaiba adulterated with foreign oils, which were deficient in acid resins.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 84.

Patch, E. L., found copaiba, Para, with 27.3 per cent and 37.43 per cent resin. Ten Central American samples examined assayed from 50.5 to 58 per cent. Three samples did not meet U. S. P. requirements, containing from 37.3 to 40.38 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 325.

Evans Sons Lescher and Webb (*Analytical Notes 1907-1908*, pp. 18-20) record some of their observations upon three varieties of South American balsam.

Southall's Report (1907, 10) notes that a large proportion of the balsams met with on the market during the current year have failed to pass the official tests.—*Yearbook Pharm., Lond.*, 1907, p. 49.

Gilmour, J. P., reports 5 out of 25 samples not up to Ph. Brit. requirements; gave reactions for gurgun balsam.—*Ibid.*, 1907, pp. 446-455.

Mossler, Gustav, reports examining 5 samples of copaiba; one with a specific gravity of 1.007 was contaminated with gurgun balsam; 2 were pure, and 2 additional samples with a specific gravity of 0.963 and 0.965, respectively, also contained some gurgun balsam. He also comments on Bossati's test for rosin in copaiba.—*Ztschr. d. Allg. österr. Apoth.-Ver.*, Wien, 1907, v. 45, p. 2.

The inspectors of pharmacies report that they have found many samples of copaiba adulterated with fatty oils and gurgun balsam.—*Ann. de Pharm.*, Louvain, 1907, v. 13, p. 276.

They also found capsules of copaiba in which the copaiba was wholly or partially replaced by gurgun balsam. They also found capsules of copaiba containing fatty oils.—*Ibid.*, v. 13, p. 330.

Shedd, P. W., believes that copaiba is one of the toxic drugs whose introduction into the economy means a revolt of vitality against the noxious agent; the establishment of a drug disease with an invariable functional (if not organic) pathology which technically is termed pathogenesis.—*Hahnemann. Month.*, Phila., 1907, v. 42, pp. 122-126.

CORIANDRUM.

Nelson, Burt E., describes and figures the microscopical structure of coriander.—*Merck's Report*, N. Y., 1907, v. 16, p. 130.

Blome, Walter H. (com. on adulterations), reports a sample of coriander mixed with about 20 per cent of flaxseed.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

van der Harst, J. C., found a sample of coriander containing more than 6 per cent of foreign seeds, sticks, earth, etc.—*Pharm. Weekbl.*, 1907, v. 44, p. 1506.

CREOSOTUM.

Greer, W. C., (Forest Service Bull., U. S. Dept. Agric.) discusses the methods now followed for wood distillation and calls attention to some of the resulting products.—*Pharm. Era.*, N. Y., 1907, v. 37, p. 487.

Kahn, Joseph, presents a table of reactions to differentiate creosote from phenol, cresol, and other coal-tar compounds.—*Proc. N. Y. Pharm. Ass.*, 1907, p. 241.

Gausby, R. A., reports examining one lot which was of inferior quality. It was of a pink color and gave strong indications of containing coal-tar creosote. The first drop distilled at 378° F., 36 per cent passed over below 391° F., 92 per cent passed over below 410° F.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 79.

Blome, Walter H., (com. on adulterations) reports several samples which consisted entirely of coal-tar creosote. Most samples form but 2 layers when shaken with benzin and baryta water, whereas they ought to form 3 distinct layers.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Francis, J. M., reports a number of samples which, according to the U. S. P. tests, were adulterated with "coal-tar creosote." He questions the reliability of the U. S. P. tests.—Proc. Pennsylvania Pharm. Ass., 1907, p. 85.

The inspectors of pharmacies assert that many samples of creosote were found to be of inferior quality, deficient in guaiacol, and low in specific gravity (1.08).—Ann. de pharm., Louvain, 1907, v. 13, p. 326.

Le Bailly (La Clinique, L'Union Pharm., 1907, 48, 301) recommends essential oil of bitter almonds as an efficient means of disguising the odor of creosote, being much superior to other essential oils for the purpose. For 50 gm. of a 20 per cent solution of creosote 25 drops of bitter-almond oil is sufficient; for the same quantity of a 5 per cent solution 20 drops suffice.—Pharm. J. Lond., 1907, v. 25, p. 334.

Bouchet (Progrès medical, Sept. 1, 1906) discusses the administration of creosote and points out that an excellent way is to mix the creosote with powdered charcoal, in the proportion of one part of the former to two of the latter, by weight. The resultant mixture may be administered in the form of wafers or capsules.—Therap. Gaz. Detroit, 1907, v. 31, pp. 256-257.

CRESOL.

Herzog, J., outlines the requirements for a new "crude cresol" to be included in the Ph. Germ. He believes the following requirements should be considered: (1) A high disinfecting power; (2) relatively nontoxic to man; (3) ready solubility in water; (4) freedom from contamination; (5) low price. He discusses these several requirements at some length and outlines a description for what he considers a desirable product.—Apoth. Ztg. Berl., 1907, v. 22, pp. 77-78.

Emde, H., reviews some of the recent literature on crude cresol and suggests the use of that fraction containing a preponderating amount of *m*-cresol. He reports examining 3 samples of commercial cresol and outlines a method for determining the *m*-cresol content of crude cresol.—Ibid., v. 22, pp. 104-106.

Smith, Otis W., has made a thorough canvass of the leading manufacturers in an attempt to locate cresol of proper quality. He is convinced that, for the present, pharmacists will find it almost impos-

sible to obtain cresol which will meet the pharmacopoeial requirements.—Proc. Missouri Pharm. Ass., 1907, p. 133.

Gardner, Hermann C. T., outlines Keppler's modification of Koppeschaar's method of estimating phenol as applied to the estimation of cresol.—Pharm. J. Lond., 1907, v. 24, p. 745.

Eger, E., discusses the composition of cresols and points out that the determination of the boiling point is an important indication of the identity or purity of the product.—Pharm. Ztg. Berl., 1907, v. 52, pp. 1049–1050.

Kahn, Joseph, outlines tests to differentiate cresol from phenol, creosote, and related compounds.—Proc. N. Y. Pharm. Ass., 1907, p. 241.

Philipp Röder (Jahresbericht, Wien, 1907, p. 87) reports that of 4 samples of crude cresol examined 1 was rejected on account of the low percentage of cresol.

Nitardy, F., finds that the difficulties encountered by some when making the compound cresol solution of the U. S. P. VIII may be overcome by warming the mixture of alkali and oil until saponification results, then adding the cresol.—Bull. Pharm., Detroit, 1907, v. 21, p. 208.

Rapp discusses the disinfecting value of the three isomeric cresols, reports a number of experiments and concludes that *o*-cresol is the equivalent of *p*-cresol and only slightly inferior to *m*-cresol in bactericidal action. He is not in favor of the proposed separation of the several fractions of cresol.—Apoth. Ztg., Berl., 1907, v. 22, pp. 642–644.

Blyth and Goodban report experiments on the germicidal action of the several cresols and of phenol on cultures of *Bacillus coli communis*.—Chem. Repert. Cöthen., 1907, v. 31, p. 399.

Blumenthal and Jacoby report experiments made to determine the nature of the toxicity of cresol.—Biochem. Ztschr. Berl., 1907, v. 7, pp. 39–44.

Wandel presents a contribution to the pathology of lysol and cresol poisoning and reports on the structural changes observed in experimental cases of cresol poisoning.—Arch. f. exper. Path. u. Pharmakol. Leipz., 1907, v. 56, pp. 160–185.

Bial, Manfred, criticises the conclusions arrived at by Wandel, particularly the appearance of free cresol in the gall bladder.—*Ibid.*, v. 56, pp. 416–419.

Wandel replies, *Ibid.*, v. 56, pp. 420–421.

Additional references on the use and the toxicology of cresol and preparations containing it will be found in Jahresbericht über.—Tier. Chemie and in the Index Medicus.

CRETA PRÆPARATA.

Gilmour, J. P., reports 4 out of 12 samples of prepared chalk not up to Ph. Brit. requirements; silica and sulphates present.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

CUBEBA.

Blome, Walter H., (com. on adulterations) reports on 5 samples of cubeb which assayed from 18.85 to 26.88 per cent of oleoresin.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 21) found 4 samples with an amount of oleo-resin extracted by ether ranging from 21.13 to 22.8 per cent.

Philipp Röder (Jahresbericht, Wien, 1907, p. 72) found that 2 of the 4 samples of cubeb examined exceeded the 9 per cent limit for ash, one sample consisting largely of stems also fell below the 12 per cent minimum of ether-alcohol extract.

Niece, Frederic E., outlines a color reaction for testing the identity of tincture of cubeb.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 482.

CUPRI SULPHAS.

White, Edmund, describes cupric sulphate, outlines a number of tests to which the substances used as an analytical reagent should correspond and describes the trade varieties.—Pharm. J. Lond., 1907, v. 25, p. 780.

Gooch and Heath discuss the iodometric estimation of copper.—Ztschr. f. anorg. Chem., 1907, v. 55, pp. 119-129.

Moser, L., presents observations on the iodometric estimation of copper according to the method of Haën, and discusses the communication by Gooch and Heath.—*Ibid.*, v. 56, p. 143.

Kellerman and Beckwith discuss the effect of copper upon water bacteria and the use of copper sulphate in connection with filtration.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 100, pp. 57-71.

Kellerman, Pratt, and Kimberly discuss the disinfection of effluents for the protection of public water supplies, and record a number of experiments on the germicidal effect of copper sulphate.—*Ibid.*, 1907, No. 115, p. 47.

Gilbert, J. L., discusses the possible use of sulphate of copper in typhoid fever.—Med. Rec., N. Y., 1907, v. 71, pp. 531-532.

Rogers, Frederick T., presents observations on the use of copper sulphate with dionin in trachoma with pannus.—J. Am. M. Ass., 1907, v. 49, pp. 218-223.

CYPRIPEDIUM.

Henkel, Alice, describes and figures *Cypripedium hirsutum* Mill., also known as *Cypripedium pubescens* Willd., commonly called large yellow lady's slipper, yellow lady's slipper, yellow moccasin flower, Venus' shoe, Venus' cup, yellow Indian shoe, American valerian, nerve root, male nervine, yellow Noah's ark, yellow monkey flower, umbil root, and yellow umbil. She also describes *Cypripedium parviflorum* Salisb., commonly known as small yellow lady's slipper.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 23–24.

Jennings, O. E. (Plant World 10:189–191 Au. 1907), presents a note on the poisonous qualities of the yellow lady's slipper.—Bull. Torrey Bot. Club, Chicago, 1907, v. 34, p. 219.

DIGITALIS.

Rusby, H. H., points out that digitalis is reported as growing wild in the States of Oregon and Washington, and that there should be no trouble in securing this drug of good quality.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 335.

Houghton, E. M., reports testing samples of digitalis grown in Oregon, Tennessee, and Michigan, and in every instance the drug was found to be superior to samples of first-class imported drug.—*Ibid.*, v. 55, p. 337.

Cæsar and Loretz (Geschäfts Ber., 1907, pp. 26–28) discuss the influence of atmospheric conditions, at the time of harvesting, on the activity of digitalis. Leaves gathered during a wet season only represented a comparative value of 4.4, while leaves gathered from the same location during a succeeding warm and dry spell showed a comparative value of 5.1 to 6.0.

Farr, E. H., reports some observations on the relative activity of first and second year's leaves of digitalis, and points out that the relative toxicity of the tincture from the first year's leaves and the second year's leaves is as 8½ is to 10; that is to say, the latter is rather more potent.—Pharm. J. Lond., 1907, v. 24, p. 198.

An editorial discusses the determination of the value of digitalis and also calls attention to the work done by Eyvin Wang on the estimation of values of digitalis leaves and the methods of determining the activity of the glucosides in old and in fresh leaves.—Merck's Arch., N. Y., 1907, v. 9, p. 62.

Kiliani, H., discusses the chemistry of digitoxin and records experiments made to determine the accuracy of Cloetta's statement that amorphous digitoxin represents one-half the molecular formula of the crystalline variety which Kiliani has demonstrated to be

$C_{28}H_{48}O_{10}$.—Ber. d. deutsch. chem. Gesellsch., 1907, v. 40, III, pp. 2996–2998.

Brissemoret and Derrien (Bull. gen. de Therap., 1907, v. 153, p. 382) discuss Kiliani's digitalis reaction and outline a new test which depends on the use of a mixture of acetic acid and a 4 per cent solution of oxalic acid neutralized with sodium amalgam and in which the glucoside is dissolved; the mixture is then underlaid with sulphuric acid and with crystalline digitalin yields a green and with digitalein a carmine red color. Digitonin does not react with this test.—Chem. Repert., Cöthen, 1907, v. 31, p. 198.

Huchard, H., presents a defense of the crystalline digitalin of Nativelle, which is considered to be superior to all the so-called active principles of digitalis and to the crude drug itself.—Bull. d. sc. pharmacol. Par., 1907, v. 14, pp. 105–114.

Petit discusses the solubility of crystalline digitalein. (Répert. de pharm. Par., 1907, v. 19, p. 329.) He finds that a solution of 1/15000 remains limpid after sterilization at 120° in ampoules.—J. de pharm. et de chim. Par., 1907, v. 261, p. 42.

The inspectors of pharmacies assert that "digitaline" has not been included in the pharmacopœia because of its variable composition and great activity. They consider the product to be eminently dangerous.—Ann. de pharm., Louvain, 1907, v. 13, p. 326.

Focke, C., points out the need for regulating the temperature in the physiological standardization of digitalis, and outlines the methods devised by him for accomplishing the same.—Arch. d. Pharm., 1907, v. 245, pp. 645–656.

An unsigned article quotes Stevens, Caldwell and three manufacturers as giving the percentage of alcohol in the official fluid extract of digitalis as 48.9, 48, 40, 50, and 35 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

Philipp Röder Wien, reports that the specific gravity of 5 samples of tincture of digitalis varied from 0.9040 to 0.9100 and that the extract content varied from 3.01 to 3.75 per cent.—Ztschr. d. Allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 285.

Niece, Frederic E., outlines a color reaction test for the identity of tincture of digitalis.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 482.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 72) reiterate the frequently made statement that carefully dried and preserved digitalis leaf is more stable than the tincture or other liquid preparation.

V. Bókay, A., (Berl. Tierärztl. Wochenschr.) recommends the use of a preparation of digitalis made by allowing the drug to macerate in cold water for three hours, in preference to infusion, as the former has the advantage of precluding possible decomposition by heat.—Jahresb. d. Pharm., Göttingen, for 1907, 1908, v. 42, p. 336.

An abstract (from *Mediz. Klinik*) points out that the old time warning that alkali is incompatible with infusion of digitalis is misleading, and mild alkalies like sodium bicarbonate tend to preserve the preparation.—*D.-A. Apoth.-Ztg.*, N. Y., 1907, v. 28, p. 53.

An abstract points out that the chemical incompatibilities are metallic salts and astringent decoctions. The physiological incompatibilities are of different natures. Those that have a tendency to close the kidneys and, consequently, hinder the elimination of digitalis. These are antipyrine, belladonna, and opium. Secondly, those that enfeeble the heart beats, as quinine and its salts. Finally, those that have a vascular or vaso dilator action and lower the blood pressure, as trinitrine, the iodides, etc.—*Drug Topics*, New York, 1907, v. 22, p. 100.

Friedländer, Richard, reviews the history of digitalis, its use as a household remedy and its introduction into the regular practice of medicine.—*Therap. Monatsh.*, Berl., 1907, v. 21, pp. 173-175.

An unsigned abstract points out that the literature of digitalis dates back to 1785, when Withering first published his observations on the use of this drug. The influence of this drug on the action of the heart was not recognized until described by Blake, in 1839, and further explained by Traube some twelve years later.—*D.-A. Apoth.-Ztg.*, N. Y., 1907, v. 28, p. 28.

An abstract from the *Hospital* points out that in many cases in which digitalis is needed the conditions are too urgent to allow time for experimenting on the patient to find out whether this or that sample of digitalis is the more active. The activity of any given sample should be known with certainty beforehand. In other words, the preparations of digitalis to be ideal should be standardized.—*Chem. & Drug.*, Lond., 1907, v. 70, p. 527.

An editorial discusses the efficiency of digitalis preparations, and points out that although digitalis is one of the most valuable and widely used drugs, its administration is accompanied by so many uncertainties that it has fallen greatly in medical estimation.—*Med. Rec.*, N. Y., 1907, v. 71, p. 356.

Edmunds, Charles Wallis, presents a study on the influence of digitalis, strophanthus, and adrenalin upon the velocity of the blood current.—*Am. J. Physiol.*, Bost., 1907, v. 18, pp. 129-148.

Fraenkel, Albert, discusses the cumulative action of digitalis, and points out that digalen does not differ in this respect from the other well-known digitalis principles.—*Arch. f. Path. u. Pharmakol.* Leipzig, 1907, v. 57, pp. 123-130.

In discussing the internal administration of digitalis he asserts that the powdered leaf appears to be preferable to any of the available preparations.—*Ibid.*, v. 57, pp. 131-136.

Additional references on the use of digitalis will be found in the *Index Medicus* and the *J. Am. M. Ass.*

ELASTICA.

Harries, C., discusses the occurrence of properties of rubber and also its composition and the efforts that have been made to produce it synthetically.—*Ztschr. f. ang. Chem. Berl.*, 1907, v. 20, pp. 1265–1271.

Jones, J., (*West Indian Bulletin*, v. 7, pp. 16–20) reports experiments and observations on rubber yielding plants in Dominica. He concludes that the Central American rubber tree, *Castilloa elastica*, is best adapted to cultivation in Dominica, and can be utilized as shade for cacao.—*Bot. Centralbl.*, 1907, v. 105, p. 480.

Dunstan, Myndham, discusses the chemical problems connected with the production of rubber, of caoutchouc, and the available supply of rubber and the possible development of new sources.—*Bull. Dept. Agric., Jamaica*, 1907, v. 5, pp. 34–37.

Ridley, H. N., presents some notes on the paper by Dunstan, and points out that synthetic rubber has long been the boggy of would-be investors of rubber. He believes that it is hardly probable that any substance will be found which is readily converted into rubber at a cheaper rate than the natural products now available.—*Ibid.*, v. 5, pp. 37–39.

Olsson-Seffer, Pehr, presents some observations on rubber planting in Mexico and Central America; discusses the name “castilla,” and records the efforts that are being made in the cultivation of this plant in Mexico.—*Ibid.*, v. 5, pp. 191–223.

Additional references on the cultivation of rubber will be found in *Bot. Centralbl.* and in the *Exp. Sta. Record*.

ELATERINUM.

Cohn, Alfred I., thinks it unnecessary to have a special formula for a trituration of elaterin since the formula for this in no wise differs from the general formula for “Triturationes.”—*Proc. New York Pharm. Ass.*, 1907, p. 235.

ELIXIRIA.

Blair, Henry C., points out that the use of aromatic elixir in so many of the elixirs in the N. F. gives them an undesirable sameness.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 245.

Scoville, W. L., calls attention to some changes in the formulas for elixirs in the N. F. which he considers improvements.—*Drug. Circ.*, N. Y., v. 51, p. 294.

Hommell, P. E., believes that a number of N. F. elixirs should become official in the U. S. P.—*Proc. New Jersey Pharm. Ass.*, 1907, p. 17.

ELIXIR ADJUVANS.

Mittelbach, Wm., thinks the utility for a formula for adjuvant elixir may not be quite clear, since it is only a simple admixture, and the physician can just as well write for the ingredients.—*Proc. Missouri Pharm. Ass.*, 1907, p. 130.

ELIXIR APII GRAVEOLENTIS COMPOSITUM N. F.

Caldwell, Paul, says that 1 ounce of compound elixir of celery contains one-sixteenth grain of cocaine and 41 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 204.

ELIXIR AROMATICUM.

A contributor to the "Pharmacology" column calls attention to the numerous vehicles, including aromatic elixir, and coloring agents in the *Pharmacopœia* and the *National Formulary*.—*J. Am. M. Ass.*, 1907, v. 48, p. 1046.

The *Eclectic M. J. Cincin.*, 1907, v. 67, p. 193, quotes an article from the *New York Medical Journal* on the perils of the aromatic elixir.

ELIXIR CATHARTICUM COMPOSITUM N. F.

Beringer, George M., compares the cathartic elixir of the N. F. III with that of the N. F. II and points out that they are quite dissimilar. He thinks the new formula should have been introduced under an entirely different title.—*Proc. New Jersey Pharm. Ass.*, 1907, p. 73.

Wilbert, M. I., points out that the amount of saccharin in compound cathartic elixir is unpractical, and even when reduced to one-tenth the amount is still unpleasantly prominent.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 211.

Scoville, W. L., asserts that the quantity of saccharin directed in the formula of compound cathartic elixir, N. F., will make a nauseating elixir. Half a gm. of saccharin is as much as can be used in 1,000 cc. to be agreeable.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 294.

ELIXIR CHLOROFORMI COMPOSITUM N. F.

Beringer, George M., points out that this is not an elixir in the modern acceptation of that term.—*Am. J. Pharm. Phila.*, 1907, v. 79, p. 360.

Caldwell, Paul, says that 1 ounce of compound elixir of chloroform contains $1\frac{1}{2}$ drams of chloroform, 9 grains of powdered opium, and 62 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 204.

ELIXIR CINCHONÆ N. F.

Good, James M., believes that the elixir of cinchona is a convenient preparation and should be popular with druggists. It takes the place

of detannated elixir of cinchona and is easily and quickly prepared.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 131.

ELIXIR COCÆ N. F.

Caldwell, Paul, points out that 1 ounce of elixir of coca contains one-eighth grain of cocaine and 31 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

ELIXIR COCÆ ET GUARANÆ N. F.

Caldwell, Paul, points out that 1 ounce of elixir of coca and guarana contains one-eighth grain of cocaine and 36 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

ELIXIR CURASSAO N. F.

Blair, H. C., criticises the present N. F. formula for elixir curassao and suggests a formula which he believes yields a preparation more like the original in appearance, color, odor, and taste.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 185.

He asserts that curaçao oil of orange is not a commercial article.—Am. J. Pharm., Phila., 1907, v. 79, p. 245.

ELIXIR DIGESTIVUM COMPOSITUM N. F.

Good, James M., calls attention to the compound digestive elixir and points out that the therapeutic incompatibility of pepsin and pancreatin was pointed out some years ago by a member of a firm of manufacturers who are considered good authority. He also calls attention to the report of the Council on Pharmacy and Chemistry of the American Medical Association.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 131.

Wilbert, M. I., calls attention to the report of the Council on Pharmacy and Chemistry (J. Am. M. Ass., Feby. 9, 1907) on mixtures containing pepsin and pancreatin and the recommendation that the formula for elixir digestivum be deleted from the N. F.—Am. J. Pharm., Phila., 1907, v. 79, p. 208.

Sollmann, Torald, comments on the absurdity of mixing the digestive ferments in solution, and says:

If the solution is acid (as in the Elixir Digestivum Compositum of the National Formulary and most of the proprietary digestant mixtures) the trypsin and diastase will be destroyed; if it is alkaline, the pepsin and diastase will disappear, and if, as a last resort, it is made neutral, the pepsin will destroy the diastase, and the pepsin, in its turn, will be digested by the trypsin.—J. Am. M. Ass., 1907, v. 48, p. 416.

Scoville, W. L., states that the Council on Pharmacy of the American Medical Association has condemned all combinations of pepsin

and pancreatin, and will request the American Pharmaceutical Association to dismiss this preparation from the National Formulary. Scientifically the mixture is absurd, and its use should be discouraged. The same is true of compound powder of pepsin.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 294.

ELIXIR FERRI, QUININÆ, ET STRYCHNINÆ PHOSPHATUM.

Cohn, Alfred I., thinks that the formula for the elixir of the phosphates of iron, quinine, and strychnine contains an unnecessarily large number of ingredients and necessitates a complicated method of manipulation. He presents a formula used by him for years, which he thinks is more simple and yields a satisfactory product.—*Proc. New York Pharm. Ass.*, 1907, p. 233. (See also *Am. Druggist*, N. Y., 1907, v. 51, pp. 5, 106.)

Raubenheimer, Otto, discusses Cohn's formula for elixir of the phosphates of iron, quinine, and strychnine, and points out that the resulting preparation would not be identical with the U. S. P. product. He believes that while the U. S. P. formula requires a little pharmaceutical skill, it is readily followed and yields a satisfactory product.—*Am. Druggist*, N. Y., 1907, v. 51, pp. 70, 275.

Dawson, Edward S., believes that the formula and working process for the elixir of the phosphates of iron, quinine, and strychnine, when carefully followed, yield a product that is pharmaceutically elegant and easily superior to the product yielded by other formulas. The working process is somewhat complex, and must be carefully and exactly followed if a reasonably permanent product is desired.—*Proc. New York Pharm. Ass.*, 1907, p. 222.

Thielke, Paul, opines that the formula for elixir of iron, quinine, and strychnine phosphates is satisfactory, but that the directions are not. He suggests that they may be made to read:

Dissolve the quinine and strychnine in the alcohol. Mix the phosphoric acid with 350 cc. of aromatic elixir. Into this mixture (acid phosphoric and aromatic elixir) slowly pour the alcoholic solution of the alkaloids, previously prepared, under constant stirring.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 423.

Klenze, W. T., thinks the principal fault with the elixir of iron, quinine, and strychnine phosphate is the change of color on keeping and the difficulty of its preparation without the formation of precipitate. The change in color appears to be due to impurities in the iron salt. He recommends that the iron phosphate be freshly made from solutions of iron citrate and sodium phosphate.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, p. 380.

ELIXIR GENTIANÆ GLYCERINATUM N. F.

Scoville, W. L., states that the formula submitted by the committee for glycerinated elixir of gentian N. F. called for ground gentian and

taraxacum roots instead of the fluid extracts, but the latter were substituted in the text because of a suggestion that the preparation is more easily made from them.—Drug. Circ., N. Y., 1907, v. 51, p. 294.

Cliffe, W. L., asserts that the N. F. formula for glycerinated elixir of gentian directs less gentian than the one furnished by him a few years ago. (Am. J. Pharm., v. 70, p. 201.)—Am. J. Pharm., Phila., 1907, v. 79, p. 244.

Ferrel, O. L., expresses the belief that ground gentian and taraxacum are to be preferred to the respective fluid extracts in making this preparation.—Proc. Texas Pharm. Ass., 1907, p. 74.

Wilbert, M. I., asserts that the amount of saccharin in elixir of gentian, glycerinated is excessive, even nauseating.—Am. J. Pharm., Phila., 1907, v. 79, p. 211.

Klenze, W. T., points out that the faults of the National Formulary preparation appear to be the use of too much saccharin and too little acetic ether.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 380.

Apple, F. M., presents an improved formula for elixir gentianæ glycerinatum N. F.—Proc. Pennsylvania Pharm. Ass., 1907, pp. 115–117.

In answer to a correspondent Dr. Eli E. Josselyn, of Philadelphia, is quoted as furnishing a formula for a glycerin tonic used by Dr. John P. Gray, of Utica, which contained fluid extract of cinchona 3 drachms, diluted phosphoric acid 10 drachms, glycerin 4 ounces, sherry wine 10½ ounces.—Drug. Circ., N. Y., 1907, v. 51, p. 540.

ELIXIR GLYCEROPHOSPHATUM N. F.

Cliffe, W. L., says the N. F. formula for elixir of glycerophosphates does not yield as satisfactory a preparation as that marketed by manufacturers. He finds that by replacing the aromatic elixir with white wine the tendency to become terebinthinate is overcome; also advises to increase the amount of phosphoric acid.—Am. J. Pharm., Phila., 1907, v. 79, p. 244.

Scoville, W. L., states that the use of an aromatic elixir made with wine (125 cc. per 1,000) or the addition of about 50 cc. of wine to the formula of elixir of glycerophosphates will greatly improve this preparation.—Drug. Circ., N. Y., 1907, v. 51, p. 294.

Referring to the above abstract the editor of the Druggist Circular thinks it well to avoid making medicines so palatable with wine that their use may be unnecessarily prolonged, or a taste for wine engendered.—*Ibid.*, 1907, v. 51, p. 294.

Dunning, H. A. B., asserts that it is necessary to use the acid glycerophosphate of calcium to make a permanent solution according to the formula for elixir of glycerophosphates.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 131.

Whitney, D. V., presents a formula and outlines a method for making a compound elixir of glycerophosphates.—*Proc. Missouri Pharm. Ass.*, 1907, pp. 109–110.

Prunier, G., contributes a study on the etherification of phosphoric acid by means of glycerin and the production of glycerophosphates.—*Bull. de la Soc. de chim. de France, Par.*, 1907, v. 1, pp. 1046–1048.

Blome, Walter H., (com. on adulterations) reports examining potassium glycerophosphate containing chloride.—*Proc. Michigan Pharm. Ass.*, 1907, p. 70.

An editorial points out that "Medicine" for December, 1906, contains an article by Alfred Gorden, which emphasizes the value of phosphorus in the form of glycerophosphates in the treatment of asthenia and allied conditions. It is probable that this drug and its preparations have not been used as frequently as its merits would warrant.—*Pacific Pharm.*, San Francisco, 1907–8, v. 1, p. 89.

ELIXIR HYPOPHOSPHITUM N. F.

Dunning, H. A. B., asserts that the original formula for elixir of hypophosphites directs an insufficient amount of water, to dissolve the calcium salt; the revised formula, 420 cc. of water, is more nearly correct.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 131.

ELIXIR PARALDEHYDI N. F.

Dunning, H. A. B., points out that elixir of paraldehyde N. F., requires a larger percentage of alcohol to prevent the formation of two layers.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 131.

Caldwell, Paul, says that 1 ounce of elixir of paraldehyde contains 2 drams of paraldehyde and 39 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 204.

ELIXIR PICIS COMPOSITUM N. F.

Caldwell, Paul, says that one ounce of compound elixir of tar contains $\frac{5}{32}$ grains of morphine sulphate and 17 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 204.

ELIXIR TERPINI HYDRATIS N. F.

Dunning, H. A. B., asserts that sugar crystallizes out from the N. F. elixir of terpin hydrate only when the syrup is made stronger than the official.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 130.

Scoville, W. L., states that elixir of terpin hydrate N. F. will deposit the terpin hydrate if chilled. When this occurs it can be restored by warming. It will not remain clear below 60° F. In

accordance with the rules of the formulary, coloring agents are generally avoided in elixirs, but in the cases of elixir of terpin hydrate with codeine and elixir of terpin hydrate with heroin, Nixon has suggested that these resemble the plain elixir of terpin hydrate in appearance and taste so closely as to be practically indistinguishable, and a distinguishing color for the two that contain alkaloids is very desirable. The point is well taken.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 294.

Blair, Henry C., criticises the N. F. formula for elixir of terpin hydrate, the sugar crystallizing out of the strongly alcoholic solution.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 245.

Morgan, H. D., (*Pacific Pharm.*, Nov., 1907, 349-352) recommends the following formulas for preparing elixir of terpin hydrate: Terpin hydrate, 128 grains; glycerin, 8 ounces; and alcohol, 8 ounces. Dissolve the terpin hydrate in the glycerin by aid of heat, then add the alcohol gradually and mix. In this way the loss of alcohol is lessened. Elixir of terpin hydrate and codeine sulphate is made in the same way, dissolving in the glycerin 16 grains of codeine sulphate. Elixir of terpin hydrate and heroin is made by dissolving $5\frac{1}{2}$ grains of heroin hydrochloride, along with the terpin hydrate, in the glycerin, and substituting one-half ounce of tincture of vanilla for the same quantity of alcohol.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 72.

ELIXIR TERPINI HYDRATIS CUM CODEINA N. F.

Scoville, W. L., points out that in accordance with the rules of the formulary coloring agents are generally avoided in elixirs, but in the cases of elixir of terpin hydrate with codeine and elixir of terpin hydrate with heroin, Nixon has suggested that these resemble the plain elixir of terpin hydrate in appearance and taste so closely as to be practically indistinguishable, and a distinguishing color for the two that contain alkaloids is very desirable. He asserts that the point is well taken.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 294.

EMPLASTRA.

Pinchbeck, G., reports a study of the bacteriology of plasters and protective tissues, and calls attention to the need for greater care in rendering these preparations more perfect from a pharmaceutical and bacteriological standpoint. He concludes from his investigations that all plasters, unless sterilized, are septic, and that the degree of sterility is diminished by atmospheric exposure. In the second part of his paper he discusses sterilization by heat, with solvents, chemical sterilization, and fractional sterilization.—*Pharm. J., Lond.*, 1907, v. 25, pp. 122-126.

EMPLASTRUM PLUMBI

Eberle, A. R., suggests preserving lead plaster under water to prevent the surface oxidation which always takes place.—Proc. Wisconsin Pharm. Ass., 1907, p. 67.

Warner, H. F. (Lancet, Lond., July 13), reports a case of acute lead encephalopathy following the use of diachylon pills as an abortifacient.—J. Am. M. Ass., 1907, v. 49, p. 526.

EMULSA

LaPierre, E. H., discussing the U. S. P. emulsions, points out that the official emulsion of cod liver oil is so thick that when administered to patients it adheres to the mouth and tongue, causing, in many cases, nausea and an aversion to the remedy which is often to be continued for a long time. He exhibited a sample of the emulsion carrying 50 per cent of oil but made with two-thirds of the gum directed. Another sample of the same emulsion was shown containing a small amount of salt; this was found to increase palatability more than aromatic oils.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 149.

Koehler, A. P., (Schweiz. Wochschr. 45, 284) discusses the characteristics of true and false emulsions. For the preservation of emulsions he states that glycerol prevents decomposition of the aqueous portion, and ethereal oil that of the fat. He recommends benzaldehyde as especially useful for the latter purpose.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1895.

Royce, S., presents some observations on emulsifiers and emulsifications and points out that emulsifying agents are mostly of a colloidal nature, whether we use albuminous bodies, such as casein or yolk of egg, or mucilaginous bodies, such as gums acacia and tragacanth, or use saponaceous agents, like the soaps or saponin which is contained in quillaia or senega. He records some experiments on the separation of the emulsion and points out that the weaker emulsion separates more rapidly.—Chem. & Drug., Lond., 1907, v. 70, pp. 137-138. (See also Merck's Report, N. Y., 1907, v. 16, pp. 96-97.)

An unsigned article discusses the making of emulsions by means of alkali or soap and gives a number of type formulas.—Pharm. J., Lond., 1907, v. 24, pp. 720-721.

An unsigned article discusses the making of emulsions and gives several type formulas.—The Spatula, 1907-8, v. 14, pp. 175-177.

Bourdier, L., has experimented with various emulsifying agents, such as *egg yolk*, *tragacanth*, *lime water*, *casein*, and *soap*, and gives the results of his experiments.—J. de Pharm. et de chim. Par., 1907, v. 26, pp. 201-205.

An abstract describes and figures a machine for making emulsion in large quantities.—Am. Druggist, N. Y., 1907, v. 51, p. 336.

EMULSUM OLEI MORRHUÆ.

Walter, E., discusses the directions for the preparation of emulsion of cod liver oil. He believes that tragacanth is less desirable than acacia; also points out that alcohol is a more desirable preservative than glycerin. Gualtheria he believes to be objectionable as a flavoring ingredient and asserts that Germans at least prefer anise or lemon as a predominant flavor.—*J. d. Pharm. von Elsass-Lothringen*, 1907, v. 33, pp. 294-296.

Dawson, Edward S., points out that while the official process looks easy of manipulation failure may result from too strict adherence to the pharmacopœial directions. He advises rubbing the powdered acacia with half of the volume of cod liver oil specified in the formula and adding to this mixture at once all of the required water and triturating rapidly until the oil is thoroughly emulsified, and then adding the balance of the oil in small portions, triturating each portion until fully emulsified.—*Proc. New York Pharm. Ass.*, 1907, p. 222.

EMULSUM PETROLEI N. F.

Hommell, P. E., thinks emulsion of petroleum should become official; it is an invaluable preparation, especially with the hypophosphites, given internally. It gives good results in the treatment of pulmonary troubles.—*Proc. New Jersey Pharm. Ass.*, 1907, p. 62.

Scoville, W. L., states that yellow petrolatum is better for emulsion of petroleum N. F. than white; it makes a more creamy emulsion. To make it succeed commercially some calcium or sodium hypophosphite should be added.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 294.

EPINEPHRINA.

Maben, T., gives a historical account of adrenalin and epinephrin together with arguments why this principle, if made an official drug in the next *Ph. Brit.* should be known by the name adrenalin.—*Pharm. J. Lond.*, 1907, v. 24, pp. 388-392.

"Gnomon" asserts that it is gratifying to learn that no proprietary rights are claimed in the word "adrenalin," since that term is obviously a most suitable one for application to the active constituent of the adrenal substance, and is now widely used.—*Ibid.*, v. 24, p. 432.

Martin, William, discusses the respective desirability of adopting the name epinephrin or adrenalin and expresses the hope that the work of Professor Abel will receive a well-deserved recognition by the name he gave to the substance being selected as its official designation.—*Ibid.*, v. 24, p. 447.

Maben, Thomas, discusses the proposed use of epinephrin in place of adrenalin as the name for the blood pressure raising principle of the suprarenal capsules, and points out that the substance to which the name epinephrin was applied in the early period is not the same as the epinephrin of the present day.—*Ibid.*, v. 24, pp. 482-483.

Martin, William, in replying to the comment by Maben points out that Professor Abel's papers are recognized as being the earliest definite records of continuous research on the subject of the vasoconstrictor element of the suprarenal capsules.—*Ibid.*, v. 24, p. 514.

Kwisda, A., reviews the progress that has been made in our knowledge of the chemistry of the alkaloid of the suprarenal gland during the year 1906.—*Pharm. Post*, Wien, 1907, v. 40, p. 182.

Sohn, Charles E., presents a review of the investigations that have been made on the composition of adrenalin and adrenalin-like bodies, and the production of synthetic compounds of this type.—*Pharm. J. Lond.*, 1907, v. 24, p. 623.

Turner, Joseph L., reviews the progress that has been made in synthesis of adrenalin.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 449-457.

An unsigned article describes a synthetic suprarenin marketed in Germany.—*Pharm. Ztg.*, Berl., 1907, v. 52, p. 466.

Krull, K. (*Pharm. Weekbl.*, 1906, v. 43, p. 1208), gives the following test for the identity of adrenalin: Several drops of a (1:1000) solution of adrenalin mixed with 1 drop each of solution of copper sulphate and solution of potassium cyanide produce a characteristic red color.—*Jahresb.*, d. Pharm. Göttingen, 1907-8, v. 42, p. 236.

Gunn and Harrison outline a new characteristic reaction of adrenalin, depending on the generation of a red-brown color when adrenalin is treated with a solution of caustic potash or soda. This color reaction is accompanied by an odor resembling in a remarkable way that of phosphoretted hydrogen.—*Pharm. J. Lond.*, 1907, v. 24, p. 718.

Finnemore, Horace, discusses the new test for adrenalin outlined by Gunn and Harrison, and asserts that the odor to which they call attention is that of methylamine and that if one adds to the reaction mixture, in a test tube, two drops of chloroform, and warms, the characteristic smell of methyl-isocyanide is readily obtained according to the well-known reaction $\text{CH}_3\text{NH}_2 + \text{CHCl}_3 = \text{CH}_3\text{NC} + 3\text{HCl}$. The smell of the isocyanides is even more penetrating and characteristic than that described by the authors noted above.—*Ibid.*, v. 24, p. 768.

Several additional comments on the characteristic test for adrenalin, noted by Gunn and Harrison, are presented.—*Ibid.*, v. 24, p. 796.

"Gnomon" calls attention to some of the more recent work published in connection with the pharmacy of the active principle of the

suprarenal gland, also to the fact that this principle is an extremely delicate test for the presence of minute traces of iron.—*Ibid.*, v. 25, p. 214.

Gunn and Harrison give formulas for the making of pharmaceutical preparations of adrenalin and also outline tests for the preparations.—*Ibid.*, v. 25, p. 310.

Finnemore, Horace, presents a formula for solution of adrenalin to which a small proportion of sulphurous acid has been added to prevent discoloration.—*Ibid.*, v. 24, p. 586.

A communication from Parke, Davis & Co. points out that sulphurous acid has all along been known to prevent the coloration of solutions of adrenalin chloride, but it is not equally certain that it will also prevent the deterioration of the blood-pressure-raising principle. When two such energetic substances as adrenalin and sulphurous acid are brought into contact it is a chemical necessity that one or other of them, and in all probability both, should undergo change.—*Pharm. J., Lond.*, 1907, v. 24, p. 683.

Grübler, M., points out that adrenalin solutions may be sterilized, providing care is exercised in the selection of a container, as the alkaloid is readily decomposed by free alkali.—*Pharm. Post, Wien*, 1907, v. 40, p. 581.

An editorial calls attention to the amount of discussion that has been caused by the active constituent, or blood-pressure-raising principle, of the suprarenal gland.—*Pharm. J., Lond.*, 1907, v. 24, pp. 774-775.

Flury, Ferdinand, reviews some of the recent publications on the constitution of the active principle of the suprarenal gland on the production of this substance in the organism and the possible production of an adrenalin-like body synthetically.—*Ztschr. f. ang. Chem., Berl.*, 1907, v. 20, p. 615.

Gioffredi, Carlo, discusses the destruction of adrenalin in the organism.—*Arch. farmacol. sper., Roma*, 1907, v. 6, pp. 127-161.

Rogée, H., discusses the use of adrenalin in connection with local anesthetics and reviews some of the literature relating to its use in this connection.—*Pharm. Zentralh.*, 1907, v. 48, p. 204.

Falk, Fritz, discusses the structural changes produced in the blood vessels of rabbits by the injection of adrenalin, reports some experimental work, and presents a compilation of the literature that has accumulated.—*Ztschr. f. exper. Path. u. Therap.*, 1907, v. 4, pp. 360-388.

Crawford, Albert C., discusses the uses of suprarenal glands in the physiological testing of drug plants, also discusses the separation of the active principle of the suprarenal gland, and presents a bibliography of the literature relating to the development of this principle.—*Bull. Bur. Plant Ind., Dept. Agric.*, 1907, No. 112, pp. 7-32.

Buchanan, Drysdale T., points out that adrenalin, by contracting the capillaries, raises the blood pressure. This contractile power when exercised upon the coronary arteries produces an anemia of the heart muscle, with instant relaxation of the systolic contractions.—Tr. Am. Inst., Homœop., 1907, 63d session, p. 619.

See also under *Glandulæ Suprarenales Siccæ*.

Additional references on the chemistry and on the use of epinephrin will be found in the Index Medicus, the J. Am. M. Ass., and in Chemical Abstracts.

ERGOTA.

Nelson, Burt E., describes and figures the structural characteristics of ergot and enumerates its various constituents.—Merck's Report, N. Y., 1907, v. 16, p. 163.

Zimmermann (Ztschr. f. Pflanzenkrankheiten, v. 16, pp. 129-131) reports results of experiments to determine the germinative qualities of old samples of ergot. He concludes that sclerotium of *Claviceps purpurea* is capable of germinating even after keeping for two years.—Chem. Centralbl., 1907, v. 104, p. 290.

The Ph. Dan. VII gives *secale cornutum*, syn. *Ergotum secale* as the official title for ergot.

Gordin, H. M., discusses the progress made in the chemistry of ergot during the year 1906.—Pharm. Rev., Milwaukee, 1907, v. 25, pp. 341-345.

Puckner, W. A., calls attention to the work done during 1906 as to the question "is the activity of ergot due to an alkaloid" and whether, therefore, the valuation of ergot may be based on its alkaloid contents.—*Ibid.*, v. 25, p. 323.

An editorial points out that ergot is a structural compound that has never yielded to the chemist anything that takes the place of ergot. The so-called ergotine of the market is simply a purified extract of ergot, and sometimes not well purified.—Paint, Oil, and Drug Rev., Chicago, 1907, v. 43, May 8, p. 25.

Barger, Carr, and Dale describe an active alkaloid which they have separated from ergot to which they have given the name ergotoxine. They call attention to the properties which differentiate it from ergotinine, the alkaloid separated from ergot by Tanret.—Pharm. J., Lond., 1907, v. 24, p. 24.

They report (Brit. Med. J.) that the newly isolated alkaloid ergotoxine is extremely active physiologically, 0.0005 to 0.001 gm. given intravenously to a cat causes a large and long-continued rise of blood pressure, succeeded by vasomotor reversal.—Bot. Centralbl., 1907, v. 104, p. 469.

Barger and Carr discuss the alkaloids of ergot, reviewing briefly the literature, and give the results of their own work.—J. Chem.

Soc., Lond., 1907, v. 91, pp. 337-353. (See also Pharm. J., Lond., 1907, v. 24, p. 520.)

Barger, G., corrects a former statement and now agrees with Kraft that ergotoxin (hydroergotin) is converted by boiling methyl alcohol into ergotinin.—Arch. d. Pharm., 1907, v. 245, p. 235.

Kraft, F., corroborates an observation made by Barger and Carr that hydroergotin (ergotoxine) may be made to yield crystalline salts.—*Ibid.*, v. 245, pp. 644-645.

An unsigned article reviews the article by Kraft (Arch. d. Pharm., 1906), and points out the several stages of development in our knowledge of the chemistry of ergot.—Suedd. Apoth. Ztg., 1907, v. 47, p. 42.

An editorial points out that there is still considerable uncertainty as to the exact chemistry and physiological activity of the active constituents of ergot. The crystalline alkaloid ergotinine is chemically closely related to the amorphous alkaloid ergotoxine. Ergotoxine is supposed to possess to a high degree the physiological properties of the drug. Wenzell, who began his studies of the active constituents of ergot about thirty years ago, is still continuing his chemical investigations.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 87.

Cæsar and Loretz (Geschäfts, Ber., 1907, pp. 104-106 (discuss a qualitative test for and a quantitative estimation of cornutin in ergot.

Fernau, Albert, reports experiments to determine the presence of sclererythrin in the extract preparations of ergot, and points out that the presence of this substance will give an indication of the method followed in the making of the preparation.—Pharm. Post., Wien, 1907, v. 40, pp. 133-134.

Dohme, A. R. L., asserts that the quality of the available ergot is far from being satisfactory, the majority of the available samples varying between 0.10 and 0.18 per cent of cornutin; he also expresses the belief that the cornutin content of ergot is not a satisfactory indication of its activity.—D.-A. Apoth.-Ztg., N. Y., 1907, v. 28, p. 133.

Blome, Walter H., (com. on adulterations) reports that ergot is generally of very fair quality, though some very inferior drug finds its way into the market.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 51) report that during the year even the better grades of ergot did not exceed 0.250 to 0.279 per cent of cornutin, and that some of the samples examined contained as low as 0.104 to 0.180 per cent.

Bührer, C., points out that the formula for preparing extract of ergot by extracting the drug with water and treating the resulting

extractive with alcohol has been adopted by all recently published pharmacopœias with the single exception of the U. S. P.—Schweiz. Wehnschr. f. Chem. u. Pharm., Zürich, 1907, v. 45, p. 419.

Greenish, Henry G., points out that the international agreement requires the aqueous extract to be treated with 60 per cent alcohol. All the pharmacopœias, except the U. S. P., comply practically with this requirement. The U. S. P. makes, however, no attempt to bring its formula into line.—Pharm. J. Lond., 1907, v. 24, p. 832.

Gane, E. H., points out that ergot yields from 14 to 22 per cent, average 18 per cent, of extractive to the official menstruum and that the resulting fluid extract contains approximately 34.2 per cent by weight or 41 per cent by volume of absolute alcohol. Distilled, 40.52 per cent by volume.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 319.

Duliére, Walter, discusses the preparation of fluid extract of ergot and points out the difficulty of exhausting the fat containing powder with 20 per cent alcohol. He recommends the preliminary removal of the fat.—J. de pharm. d'Anvers, 1907, v. 63, pp. 601-602.

Philipp Röder (Jahresbericht, Wien, 1907, p. 51), examined 5 samples of fluid extract of ergot, 2 of which were found to contain less than 20 per cent of dried residue required by the pharmacopœia.

Lisin, F., reports experiments and observations on the influence of ergot on the cardio-vascular system.—Arch. internat. de Pharmacod. et de Thérap. 1907, v. 17, pp. 475-480.

Kinyon, C. B., asserts that "Secale cor." is a remedy greatly abused by the old school. It is indicated in a variety of conditions particularly when the lochia are frequently suppressed, thin, dark, and offensive. This is a condition which calls for extreme watchfulness, as it is frequently the forerunner of uterine inflammation.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 391.

Watkins finds most frequent use for ergot, not as an oxytocic, but to control hæmorrhage when he combines it with tincture of oil of cinnamon and when there is pain with morphia.—Eclectic M. J., Cincin., 1907, v. 67, p. 69.

Additional references on the use of ergot will be found in the Index Medicus and the J. Am. M. Ass.

ERIODICTYON.

Mossler, Gustav, reports some work on the composition of eriodictyon glutinosum, the distillation of this drug with steam, the examination of the petroleum benzin extract, the ether extract, the examination of the crystalline body, and its behavior with certain reagents.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, pp. 135-137, 147-149, 163-165.

Thomann reviews the observations by Mossler on the constituents of *Eriodictyon glutinosum* Benth., and suggests the need for addi-

tional work on this now widely used drug.—Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 282.

Power and Tutin report on the constitution of homo-eriodictyol, a crystalline substance from eriodictyon leaves.—J. Chem. Soc. Lond., 1907, v. 91, pp. 887–896.

ESSENTIA PEPSINI N. F.

Ferrel, O. L., expresses the belief that essence of pepsin would be more active if it contained a smaller per cent of alcohol in the finished product.—Proc. Texas Pharm. Ass., 1907, p. 74.

Scoville, W. L., states that the angelica wine in essence of pepsin N. F. should not be fortified, but should be as low in alcohol as possible to ensure an active preparation. Ten per cent of alcohol in the finished preparation is better than 15, because the pepsin will be more active.—Drug. Circ., N. Y., 1907, v. 51, p. 294.

EUCALYPTOL.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 101), point out that the corrections of the U. S. P. up to June 1, 1907, provide that eucalyptol should have a specific gravity of from 0.921 to 0.923 at 25° C.

The inspectors of pharmacies assert that eucalyptol is occasionally found substituted by oil of eucalyptus which has a lower specific gravity and does not crystallize at 0° C.—Ann. de pharm. Louvain, 1907, v. 13, p. 327.

EUCALYPTUS.

Kramer, Hans, presents a description with illustrations of the characteristic structures of the leaf of eucalyptus and of the resulting powder.—Ber. d. pharm. Gesellsch., Berl., 1907, v. 17, pp. 319–323.

Smith, H. G., presents a comprehensive review of the recent work on the eucalypts, and concludes that the amount of chemical work still to be done is considerable, as many problems remain to be solved.—J. Soc. Chem. Ind. Lond., 1907, v. 26, pp. 851–857.

A book review presents a discussion of "Critical Revision of the Genus Eucalyptus," by J. H. Maiden, government botanist of New South Wales and director of the Botanic Gardens, Sydney, Part VIII, which deals mainly with the stringy barks, which are recognized by every systematic botanist as being specially difficult.—Pharm. J. Lond., 1907, v. 24, p. 645.

An unsigned article quotes Stevens, Caldwell, and 3 manufacturers as giving the percentage of alcohol in the official fluid extract of eucalyptus as 71.0, 72, 60, 80, and 50 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

EUGENOL.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 101) point out that the corrections of the U. S. P. up to June 1, 1907, provide that eugenol shall have a specific gravity of from 1.066 to 1.068 at 25° C.

EUONYMUS.

Farwell, O. A., asserts that Wahoo bark is frequently difficult to obtain in a pure state. The adulteration consists in slicing off more or less of the wood along with the bark. Sometimes lots have been found to contain upward of 25 per cent of wood.—Merck's Report, N. Y., 1907, v. 16, p. 221.

Deweese, W. M., finds wahoo a most efficient remedy in that species of dyspeptic or stomach pain which occurs when the stomach is empty, and is relieved by a light lunch, cup of tea, or a cracker.—Eclectic M. J. Cincin., 1907, v. 67, p. 162.

EUPATORIUM.

Henkel, Alice, describes and figures *Eupatorium purpureum* L., commonly called queen of the meadow, gravelroot, Indian gravelroot, joepyee weed, purple boneset, tall boneset, kidney root, king of the meadow, marsh milkweed, motherwort, nigger weed, quillwort, slunk weed, and trumpetweed.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 61–62.

Farwell, O. A., asserts that a very large percentage of the Boneset collected in 1906 is of very poor quality, owing to the carelessness of collectors, both in collecting and in curing; the samples of the drug on hand contained a large amount of worthless stem and the leaves are dark colored, due to overheating or sweating through inattention or improper handling during the drying process.—Merck's Report, N. Y., 1907, v. 16, p. 220.

EXTRACTA.

William, Joseph H., discusses the preparation of alcohol extracts and describes and figures an apparatus designed for continuous extracting.—Pharm. J., Lond., 1907, v. 25, p. 534.

Thornewell, Albert R., commenting on the paper by J. H. Williams for making solid or liquid extracts, points out that it would be well to carefully inquire into the effect of prolonged heating on the alkaloidal and other constituents of the drugs treated before adopting this method.—*Ibid.*, v. 25, p. 592.

Philipp Röder (Jahresbericht, Wien, 1907, p. 11) points out that the dried substance in extracts is best determined by mixing 1 gm. of the extract with approximately 2 cc. of water, or, when necessary, alcohol, and drying the resulting solution on a tared dish of approxi-

mately 5 cm. in diameter for three hours, and weighing. The residue multiplied by 100 gives the amount of dried substance contained in 100 gms. of extract.

EXTRACTUM MALTI

Blome, Walter H., (com. on adulterations) reports the examination of several samples of malt extract; one had no digestive value whatever, was off in taste, odor, and general appearance.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Rodwell, H., makes some practical suggestions concerning the utility of a liquid malt extract as a vehicle for certain medicaments, such combinations usually finding favor with patients. He asserts that the ordinary malt extract, which usually has a density of 1.375 or over, is not convenient for this purpose, and he therefore suggests a "liquid extract" obtained by incorporating 68 parts of the extract of malt (specific gravity, 1.375) with a previously prepared mixture of 7.5 parts of 90 per cent alcohol and 25 parts of distilled water, and then adjusting the whole by addition of sufficient water to produce 100 parts of product. After standing until clear, the liquid is decanted or syphoned from the deposit formed and is ready for use. He gives formulas for the combination of malt and cascara, hæmoglobin, hypophosphites, glycerophosphates, iron, pancreatin, and pepsin.—Pharm. J., Lond., 1907, v. 24, p. 452.

"Gnomon" calls attention to the formula for malt extract preparations offered by Mr. Rodwell, and commends the idea of making all the finished preparations measure or weigh 100 parts. This method of representing the quantities in formulæ is of advantage in that the approximate percentage of composition of the articles can readily be determined.—*Ibid.*, v. 24, p. 492.

FERRI CARBONAS SACCHARATUS.

Dawson, Edward S., in preparing saccharated carbonate of iron protects the ferrous sulphate and ferrous carbonate with plenty of sugar from start to finish.—Proc. New York Pharm. Ass., 1907, p. 223.

Dulière, W., discusses the Ph. Belg. III requirement and formula for saccharated carbonate of iron, and expresses the belief that the addition of sugar of milk is an improvement.—Ann. de pharm. Louvain., 1907, v. 13, pp. 369-372.

Franklin, J. H., presents a new method of preparing saccharated carbonate of iron and suggestions for its use in pharmacy, the object being to obtain, if possible, a compound containing at least 66 per cent of ferrous carbonate, or, preferably, 69 to 70 per cent. He discusses also iron tablets, pills, and capsules.—Year Book Pharm. Lond., 1907, pp. 435-438. (See also Pharm. J. 1907.)

Crewe, Philip H., discusses the determination of ferrous carbonate in saccharated ferrous carbonate and recommends an assay method. He likewise discusses the determination of ferrous carbonate in pilula ferri, and compares the influence of certain organic matter.—*Ibid.*, pp. 455-468.

Kal, A., (Pharm. Weekbl.) presents a formula for a solution of ferrous carbonate.—*Am. J. Pharm. Phila.*, 1907, v. 79, p. 427.

Wilbert, M. I., outlines a formula for a solution of ferrous sulphate and potassium carbonate in glycerin which, on dilution with water, yields freshly precipitated or nascent ferrous carbonate.—*Am. J. Pharm. Phila.*, 1907, v. 79, p. 525.

FERRI CHLORIDUM.

Klose, G., found that adeps lanæ dissolved 4.01 per cent of ferric chloride.—*Arch. internat. de Pharmacod. et de Therap.*, 1907, v. 17, p. 461.

FERRI HYPOPHOSPHIS.

Golby and Finnemore discuss the preparation of the strong solution of iron hypophosphite B. P. C. and outline a method which they have adopted and which yields a product similar to, but perhaps rather brighter in color than, that obtained by the B. P. C. method.—*Pharm. J. Lond.*, 1907, v. 24, p. 102.

FERRI SULPHAS.

Blome, Walter H., (com. on adulterations) reports that ferrous sulphate frequently contains free sulphuric acid.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Klose, G., found that ferrous sulphate was practically insoluble in adeps lanæ.—*Arch. internat. de Pharmacod. et de Therap.*, 1907, v. 17, p. 461.

FERRUM.

Kerbosch, H., (Pharm. Weekbl., 1907, No. 34) finds that the test of the Ph. Ndl. for the detection of copper in powdered iron, which is similar to that of the Ph. Germ. IV, suffers from the defect that some of the copper present may escape detection.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 292.

Nannestad, F., recommends the titrimetric estimation of iron by means of potassium dichromate. He outlines the test, which depends on the oxidation of a ferrous chloride into ferric chloride according to the following reaction: $K_2Cr_2O_7 + 14HCl + 6FeCl_2 = 2KCl + 2CrCl_3 + 7H_2O + 6FeCl_3$.—*Apoth. Ztg. Berl.*, 1907, v. 22, p. 891.

Bergh, Gustaf, Fr., (*Svensk Farmaceutisk Tidskrift*, 1907, pp. 241-247) discusses the iodometric estimation of iron and concludes

that in fairly concentrated solutions with a slight excess of potassium iodide reliable results may be secured in comparatively short time.—Apoth. Ztg. Berl., 1907, v. 22, p. 664.

Lutz, O., (Chem. Ztg., 1907, p. 570) finds that if an aqueous solution of protocathechuic acid be added to a liquid containing a minute trace of iron and then a few drops of normal sodium carbonate solution, to impart a slight alkalinity, a red color will be developed.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 292.

The Council on Pharmacy and Chemistry discusses "masked" or "nonionic" iron preparations, and calls attention to the distinction to be drawn between the therapeutic terms "organic" iron and "masked" or "nonionic" iron.—J. Am. M. Ass., 1907, v. 48, p. 611.

Meinertz, J., reviews the literature relating to the behavior of iron and of the compounds of iron in the body. Includes upward of 75 references.—Zentrbl. f. Physiol. u. Path. d. Stffwchls. 1907, v. 2, pp. 652–662.

Long, Eli H., stated that he had made clinical comparisons of the official inorganic salts of iron and some of the unofficial organic, and he concluded that the official were to be preferred in the treatment of chlorosis and anemia.—N. York M. J., 1907, v. 86, p. 233.

Hirschfeld, Hans, asserts that the controversy as to the comparative usefulness of organic and inorganic iron is now definitely settled and that both have a field of usefulness. Inorganic preparations act more intensively, while the organic preparations are indicated only in cases where the former are absolutely not tolerated.—Therap. d. Gegenw., Berl., 1907, v. 48, p. 78.

Feigl, Johann, reports the results of his experimental researches on the influence of medicaments on gastric secretion, taking up first iron and the iron preparations.—Biochem. Ztschr. Berl., 1907, v. 6, pp. 17–60.

Morgenstrew (Arch. de stomat. Par., Aug., 1907) finds that almost all preparations containing iron exercise an injurious action upon the teeth. Those causing most marked erosion are the iodides and chlorides and preparations containing them, while the albuminates and the manganates are practically innocuous.—Dental Cosmos, Phila., 1907, v. 49, p. 1103.

A number of additional references on the use of iron will be found in the J. Am. M. Ass. and the Index Medicus.

FERRUM REDUCTUM.

Caspari, Chas. E., (com. on adulterations) reports on 14 samples—2 U. S. P.; 10 contained excess of sulphite; 2 weak in strength.—Proc. Missouri Pharm. Ass., 1907, p. 142.

Bachman, Gustav, (com. on adulterations) reports reduced iron ranging from 83.1 to 76.5 per cent of metallic iron instead of 90 per

cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

The inspectors of pharmacies found samples of reduced iron which assayed from 40 to 50 per cent of metallic iron.—Ann. de pharm. Louvain, 1907, v. 13, p. 327.

Gilmour, J. P., reports 8 out of 9 samples below Ph. Brit. standards; more than traces of As. The next Ph. Brit. might advantageously specify a reasonable limit for arsenic.—Year Book Pharm. Lond., 1907, pp. 446–455. (See also Pharm. J. Lond., 1907.)

FERRUM.

SCALE SALTS.

FERRI PHOSPHAS SOLUBILIS.

Graham, Willard, found one sample of soluble ferric phosphate to contain ferric phosphate corresponding to 13 per cent of metallic iron.—Proc. Pennsylvania Pharm. Ass., 1907, p. 238.

Gilmour, J. P., reports 13 samples all below Ph. Brit. standards; average deficiency 23–42 per cent. It might be an advantage to adopt the ferri phosphas solubilis, U. S. P.—Year Book Pharm. Lond., 1907, pp. 446–455.

FERRI PYROPHOSPHAS SOLUBILIS.

Graham, Willard, found one sample of soluble ferric pyrophosphate to contain ferric pyrophosphate corresponding to 12.2 per cent of metallic iron.—Proc. Pennsylvania Pharm. Ass., 1907, p. 238.

Gane, E. H., examined one sample which contained equivalent of only 6.3 per cent of metallic iron.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 326.

Blome, Walter H., (com. on adulterations) reports finding ferric pyrophosphate with 6.05 instead of 10 per cent of metallic iron.—Proc. Michigan Pharm. Ass., 1907, p. 68.

FERRI ET AMMONII CITRAS.

Blome, Walter H., (com. on adulterations) reports one sample that was slightly acid.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 25) report two samples of “green scales” which yielded about 22 per cent of ferric oxide upon ignition. In eighteen commercial samples the ferric oxide ranged from 31 to 34 per cent.

Dulière, Walter, presents a study of ferric citrate, outlines a method of preparing the same, and describes the properties of iron ammonium citrate.—Ann. de pharm. Louvain, 1907, v. 13, pp. 225–229.

FERRI ET POTASSII TARTRAS.

Dulière, W., discusses the changes that have been made in the Ph. Belg. method of making iron and potassium tartrate.—Ann. de pharm. Louvain, 1907, v. 13, pp. 372-374.

Graham, Willard, found one sample to contain iron and potassium tartrate corresponding to 15.3 per cent of metallic iron.—Proc. Pennsylvania Pharm. Ass., 1907, p. 237.

FERRI ET QUININÆ CITRAS.

Cortés, V., (Rev. Cientif. prof., 1906, No. 94) prepares the citrate of iron and of quinine by dissolving 6.5 gm. perchloride of iron in 650 gm. water and adding progressively bicarbonate of soda. Allow to settle, decant, wash, and add the precipitate little by little to the citrate of quinine formed from 16.80 gm. citric acid and 19.40 gm. quinine. The syrupy liquid obtained is then spread in thin layers on porcelain plates.—Répert. de pharm. Par. 1907, v. 19, p. 275.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 26) assayed 15 samples for quinine which showed the presence of from 13.25 to 15.5 per cent, the majority lying between 14.3 and 14.8 per cent.

Frerichs, G., points out that iron and quinine citrate, in common with other scale salts of iron, represents a possibly variable mixture that can not readily be controlled by chemical tests; therefore a process of manufacture should be made official.—Apoth. Ztg., Berl., 1907, v. 22, p. 238.

Eldred and Pence discuss the U. S. P. method for the estimation of iron in scale salts and point out that in order to determine the total iron in scale salts it is necessary to employ a gravimetric method or to completely oxidize the organic acid and ferrous iron before titration.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 364-367.

FICUS.

Eisen, G. (U. S. Dept. Agric. Pomology Bull. 9; 1-317, pl. 1-15+ f. 1-93, 1901, 1902), describes the fig, its history, culture, and curing, and includes a descriptive catalogue of the known varieties.—Bull. Torey Bot. Club, Chicago, 1907, v. 34, p. 52.

FLUIDEXTRACTA.

The Ph. Dan. VII differentiates between extracts and fluid extracts by arranging the several preparations under the general headings extracta and extracta fluida.—Ph. Dan. VII.

The committee on drug market presents a table showing the per cent of alcohol in the menstruum and resulting fluid extracts of aco-

nite root, apocynum, aromatic bitter orange, berberis, buchu, cannabis indica, cimicifuga, cascara, and ergot.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 320.

Gane, E. H., points out that the alcohol content of fluid extracts (and tinctures in a lesser degree) is subject to considerable variations from the wide range of moisture in drugs and the great difference in the percentage of extractive they contain. Presents a table showing per cent of alcohol contained in the menstruum and in the finished preparation.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 318.

Stevens, A. B., presents a list of the official fluid extracts and the approximate amount of alcohol contained therein.—*Pharm. Era*, N. Y., 1907, v. 37, p. 56.

Lyons, A. B., presents a table giving the alcohol percentage of the official fluid extracts, the percentage of alcohol in menstruum, the maximum percentage of absolute alcohol in the fluid extract and the percentage of absolute alcohol to be expected in the fluid extract.—*Am. Druggist*, N. Y., 1907, v. 50, p. 67.

Feil, Joseph, presents tabulated data relating to fluid extracts, the amounts of alcohol claimed to be in commercial fluid extracts, the amount of moisture in the ground drug, the amount of extractive, and the amount of alcohol remaining in the finished fluid extract.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 499–500.

An editorial discussing the tables of alcohol content of galenical preparations that have been published points out that practically all fluid extracts contain from 20 to 30 per cent of solid extractive and that this necessarily reduces the alcohol content proportionately.—*Drug Topics*, New York, 1907, v. 22, p. 1.

Lloyd, John Uri (*Eclectic Med. Gleaner*, iii, 1907, No. 6, 505), draws attention to an experience during a study of "Precipitates in fluid extracts" thirty years ago, which brought out the fact that whenever an alcoholic liquid casts a precipitate the liquid becomes stronger in its percentage of alcohol. He gives the figures obtained from recent experiments undertaken to establish the probable extent of variation in the alcoholic strength of fluid extracts from this cause.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 80.

Good, J. M., reports that in answer to his question: "What do you do with a fluid extract which is found by assay to be below standard?" the assayer replied, "We put in enough of the alkaloid to make up the deficiency." Good believes this kind of a preparation is at least better than a fluid extract prepared from a poor drug, artificially colored, and given increased consistency by the use of glycerin in the menstruum.—*Nat. Druggist*, St. Louis, 1907, v. 37, p. 64.

The Committee on the U. S. P. of the American Medical Association regards the official methods of preparing syrups and wines from

fluid extracts as being unsuitable in many cases.—Pharm. J. Lond., 1907, v. 25, p. 197.

Beringer, George M., presents a formula for a fluid glycerate of krameria and suggests the possibility of developing a line of liquid extract preparations made with glycerin or mixtures of glycerin and water and having the same drug strength as the U. S. P. fluid extracts.—Am. J. Pharm., Phila., 1907, v. 19, p. 411.

FLUIDEXTRACTA N. F.

ADONIDIS N. F.

Kramer, Hans, presents a description with illustration of the characteristic structures of the leaf of adonidis and of the resulting powder.—Ber. d. pharm. Gesellsch., Berl., 1907, v. 17, pp. 310–312.

ALETRIDIS N. F.

Henkel, Alice, describes and figures *Aletris farinosa* L., also known as stargrass, blazingstar, mealy starwort, starwort, unicorn-root, true unicorn-root, unicorn-plant, unicorn's-horn, colic-root, devil's-bit, ague-grass, ague-root, aloe-root, crow-corn, and huskwort.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1907, No. 107, pp. 19–20.

ANGELICÆ RADICIS N. F.

Henkel, Alice, describes and figures *Angelica atropurpurea* L., also called *Archangelica atropurpurea* Hoffm., commonly known as angelica, purple-stemmed angelica, great angelica, high angelica, purple angelica, and masterwort.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, p. 51.

APII GRAVEOLENTIS N. F.

Kline and Graham found several lots of celery seed adulterated with olive pits or some similar material. For testing they suggest microscopic examination.—Proc. Pennsylvania Pharm. Ass., 1907, p. 83.

Stallman, A. C., reports that the appraisers of the port of New York passed at least one lot of celery seed which had been cleverly adulterated with 25 per cent of ground stone.—Proc. N. W. D. A., 1907, 33d Ann. Meet., p. 155.

CAULOPHYLLI, N. F.

Holm, Theo. (Merck's Rep., April, 1907, 94–96), calls attention to certain botanical and structural characteristics of *Caulophyllum*

thalictroides, illustrated by a large number of figures drawn from nature, which seem to justify its classification as the type of a distinct genus, as has been proposed by Bentham and Hooker.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 790.

CONVALLARIÆ, N. F.

Beringer, George M., points out that the title "Fluidextractum Convallariæ" should have *Florum* added to distinguish this from the pharmacopœial "Fluidextractum Convallariæ" made from the rhizome and roots.—Proc. New Jersey Pharm. Ass., 1907, p. 71.

GERANII, N. F.

Henkel, Alice, describes and figures *Geranium maculatum* L., also called crane's-bill, spotted crane's-bill, wild crane's bill, stork's bill, spotted geranium, wild geranium, alumroot, alum-bloom, chocolate-flower, crow-foot, dove-foot, old-maid's nightcap, and shameface.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 44-45.

HYDRANGÆE, N. F.

Henkel, Alice, describes and figures *Hydrangea aborescens* L., commonly called hydrangea, wild hydrangea, and seven-barks.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 41-42.

STERCULIÆ, N. F.

Goris and Arnould discuss the conservation and sterilization of fresh kola nuts.—Bull. d. sc. pharmacol., Par., 1907, v. 14, pp. 159-161.

Chevrotier and Vigne (Bull. sc. pharmacol., Par., Nov., 1906) succeeded by a process in which air is carefully excluded to obtain a dry preparation, having a white color, in which the caffeine is contained in its unchanged original combination, and so keeps indefinitely if mixed with sugar.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 795.

Carles, P. (Rép. de Pharm., 1907, No. 5), again calls attention to the efficiency of sugar as a preservative by a method which he proposed a number of years ago, and which secures the physiologically valuable constituents of the drug (the albuminoids, and in particular the oxydase) in an unchanged and active condition for years.—*Ibid.*, v. 55, p. 795.

FENICULUM.

Nelson, Burt E., describes and figures the structural characteristics of powdered fennel.—Merck's Report, N. Y., 1907, v. 16, p. 38.

Philipp Röder (Jahresbericht, Wien, 1907, p. 73) reports that 3 out of 5 samples of fennel seed exceeded the 10 per cent limit for ash of the Ph. Austr. VIII.

FRANGULA.

Würffel, Ludwig, reports finding frangula bark adulterated with the bark of *Alnus glutinosa* and figures the structural characteristics of the latter bark.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, pp. 211–213.

Kroeber, Ludwig, reports a comparative study of frangula and cascara sagrada and asserts that the former is uniformly more efficient and contains a higher percentage of oxymethylantraquinone.—Pharm. Prax., 1907, v. 6, pp. 417–418.

Tunmann discusses the glucosids of frangula and reviews some of the literature regarding the nature of the glucosids present.—Pharm. Zentralh., 1907, v. 48, pp. 99–103.

GALLA.

Nelson, Burt E., describes and figures the structural characteristics of powdered nutgall.—Merck's Report, N. Y., 1907, v. 16, p. 38.

A review of the chemical industries of Japan includes a statement on the production of galls in the Provinces of Kii and Shikoku and gives the amount, value, and distinction of this drug exported from Kobe.—Chem. Ind., Berl., 1907, v. 30, p. 404.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 22) separated a package of galls into four kinds, i. e., large, small, blue, and grey. The results obtained were large, 87; small, 67; blue, 79; and grey, 79 per cent of tannin in oxalic acid equivalent.

Niece, Frederic E., outlines a color reaction for testing the identity of tincture of galls.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 482–483.

GAMBIR.

La Wall, Charles H., reports on 12 samples of commercial gambir which varied greatly in physical appearance. The ash varied from 2.53 to 7.35 per cent. Of the several samples from 64.10 to 86.60 per cent was soluble in alcohol and from 40 to 78 per cent soluble in water. He concludes that samples, free from mould, possessing the physical characteristics described in the U. S. P. will invariably be found to be satisfactory.—Am. J. Pharm., Phila., 1907, v. 79, pp. 203–205.

Gane, E. H., examined 3 samples. The portions insoluble in alcohol varied from 22.06 per cent to 70.47 per cent, and the ash content from 3.39 per cent to 7.02 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 325.

Nelson, Burt E., describes catechu and discusses its appearance under the microscope.—Merck's Report, N. Y., 1907, v. 16, p. 192.

Philipp Röder (Jahresbericht, Wien, 1907, p. 35) reports that only one of four samples of catechu examined complied with the official requirements for solubility in concentrated alcohol. The ash content was well below the Ph. Austr. VIII limits, but the material insoluble in strong alcohol was uniformly high varying from 24.19 to 42.65 per cent.

An editorial comments on an article published in the Agricultural Ledger which describes Indian cutch, its origin, composition, and properties.—Chem. & Drug., Lond., 1907, v. 71, pp. 509–510.

Schneider, Albert, points out that *Acacia catechu* which yields the familiar catechu or cutch of the pharmacist, is cultivated in the southern part of the State of California; not commercially, however.—Pacific Pharm., San Francisco, 1907–8, v. 1, p. 138.

GELATINUM.

Graham, Willard, reports examining two samples of gelatin that answered the U. S. P. VIII requirements, with the exception that a 2 per cent aqueous solution of sample No. 2 formed a turbid jelly on cooling.—Proc. Pennsylvania Pharm. Ass., 1907, p. 237.

Alexander, Jerome, contributes a note on the determination of sulphurous acid in gelatin.—J. Am. Chem. Soc., 1907, v. 29, pp. 783–785.

Halla, Ed., reviews the methods that have been suggested for determining the quality of gelatin and outlines a method for the determination of the contained glutin and the determination of the nitrogen content of the glutin.—Ztschr. f. ang. Chem., Berl., 1907, v. 20, pp. 24–28.

Vamvakas asserts that by his process, with Nessler's reagent, which is more expeditious than Trillat's formaldehyde process, it is possible to discover immediately the presence of gelatin in gum syrups.—Ann. de chim. analyt. Par., 1907, v. 12, pp. 58, 139.

Kuhn and Rössler discuss the use of sterilized solutions of gelatin for hypodermic injections and their preparation. They point out the need for controlling the origin of the gelatin so as to insure its being obtained from healthy animals.—Therap. Monatsh., Berl., 1907, v. 21, pp. 184–189.

Burton-Opitz, R. (Physiol. Lab., Columbia Univ., N. Y., Pr. Soc. Exp. Biol. Med., Dec. 19, 1906), states that injections of gelatin resulted in a very prompt increase in the viscosity of the blood.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 582.

Murlin, John R., discusses the nutritive value of gelatin, particularly the substitution of gelatin for proteid, with maintenance of nitrogen equilibrium at the fasting level. He reports a number of experiments, the results of which are presented in tabulated form.—Am. J. Physiol., Bost., v. 19, pp. 285–315. (See also *ibid.*, v. 20, pp. 234–257.)

GELSEMIUM.

Henkel, Alice, describes and figures *Gelsemium sempervirens* L., Ait. f., commonly called Carolina jasmine or jessamine, Carolina wild woodbine, and evening trumpet-flower.—Bul. Bur. Plant. Ind., U. S. Dept. Agric., 1907, No. 107, pp. 51–52.

Tunmann, reports a pharmacognostic study of the rhizome of gelsemium and describes, with illustrations, the structural characteristics of this drug.—Pharm. Zentralh., 1907, v. 48, pp. 679–687.

Sayre, L. E., records experiments made to devise a satisfactory assay of preparations of gelsemium, with but indifferent results.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 356–359.

Sayre, L. E., reports a study of the alkaloids gelsemine and gelseminine and briefly reviews the history of the constituents of gelsemium.—*Ibid.*, v. 55, pp. 352–356.

Waugh, W. F. (Am. J. Clin. M., Chicago, 1907, XIV, 1440–1443), discusses some special uses of gelseminine.—Reference from Index Medicus, 1908, v. VI, pp. 47, 51.

Bloyer thinks the value of gelsemium as a pain-relieving agent is not fully realized; it is a specific for the relief of cramping pains, or spasm of the unstriated muscular fiber; for organic pain, not so much of the digestive tract as for some other organs, womb, ovaries, liver and its ducts, kidney, ureter, bladder, etc.—Eclectic M. J., Cincin., 1907, v. 67, p. 62.

Church notes that the tincture, to be of any value, should be made from the fresh root.—*Ibid.*, p. 263.

Shedd, P. W., believes that gelsemium is, “polychrestic, imposing, and very serviceable.”—Hahnemann. Month., Phila., 1907, v. 42, p. 122.

Rosenberger, A. S., asserts that gelsemium is a remedy often indicated in influenza.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 419.

Kinyon, C. B., points out that gelsemium is indicated where we have the characteristic headache beginning in the occiput and extending up over the head with a distinctive pressure-like symptom.—*Ibid.*, p. 386.

GENTIANA.

Philipp Röder (Jahresbericht, Wien, 1907, p. 102) reports 2 samples of gentian root which exceeded the Ph. Austr. VIII 5 per cent limit of ash. One sample contained as high as 8.97 and yielded only 23.73 per cent of aqueous extract.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 23) made microscopical examinations of five samples of foreign-ground drug. Of these four were adulterated with up to 40 per cent of fruit “stone” powder, whilst the fifth contained quassia wood, which apparently had been exhausted.

A news item reports the prosecution of two chemists for selling powdered gentian root adulterated with 20 per cent of ground olive stones.—*Pharm. J. Lond.*, 1907, v. 24, p. 339.

Stansfield, J. M., questions the need for retaining compound tincture of gentian in the U. S. P. He thinks a simple tincture of gentian may have some use, but the orange peel in the compound tincture he thinks objectionable on account of the tannic acid contained in the peel.—*Proc. Florida Pharm. Ass.*, 1907, p. 9.

GLANDULÆ SUPRARENALES SICCÆ.

Hallion has experimented with glycerin extracts of suprarenal capsules for a number of years; the glycerin has a dehydrating action which antagonizes the deleterious effect of the water.—*J. de pharm. et de chim., Par.*, 1907, v. 25, p. 413.

Patta, Aldo, contributes a critical and experimental study of the action of the extract of suprarenal capsules on the circulation.—*Arch. farmacol. sper. Roma*, 1907, v. 6, pp. 82–102, 114.

Miller, Joseph L., discusses the action of the extract of the suprarenal gland and the method and indications for its use in a variety of conditions, together with some remarks on the dangers of adrenalin.—*J. Am. M. Ass.*, 1907, v. 48, pp. 1661–1664.

Formánek and Eiselt present a series of observations on the therapeutic action of suprarenal extract in cases of chronic nephritis.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, pp. 230–248. (See also under *Epinephrina*.)

GLANDULÆ THYROIDEÆ SICCÆ.

Koch, F. C., discusses the standardization of thyroids, and reviews the literature relating to the determination of the iodine content of this gland.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 370.

Hunt, Reid, reports that he has applied his biologic test for thyroid (the increased resistance of mice to acetonitrile) to a specimen of blood obtained from a case of exophthalmic goiter and found that the blood afforded protection as thyroid feeding does, though Seidell was unable to detect iodine in 150 c. c. of the blood examined.—*J. Am. M. Ass.*, 1907, v. 49, pp. 240–241.

An editorial calls attention to the work of Reid Hunt in developing the biologic test for thyroid, and states that the work promises to become of unusual importance, and the hope is expressed that similar work will place therapeutics on a firm basis of experimental knowledge.—*Ibid.*, v. 49, p. 248.

The Council on Pharmacy and Chemistry reports on several preparations which have been found to contain thyroid or are said to contain that substance or extracts from it.—*Ibid.*, v. 49, pp. 1198–1203.

Fassin, Louise, discusses the influence of the inoculation of thyroid extract on the active properties of the serum.—*Compt. rend., Soc. de biol. Par.*, 1907, v. 62, pp. 388–389.

Patta, Aldo, contributes a critical and experimental study of the action of the extract of thyroid gland upon the circulation.—*Arch. farmacol. sper. Roma*, 1907, v. 6, pp. 102–106, 115.

Gordon, Alfred, discusses the use of thyroid extract in migraine and epilepsy, and reports 10 cases that have come to his observation.—*Therap. Gaz. Detroit*, 1907, v. 31, pp. 849–851.

Additional references on the properties and the uses of thyroid will be found in the *Index Medicus* and the *J. Am. M. Ass.*

GLYCERINUM.

Mitchell, Edward, points out that glycerin is a soap maker's product or by-product, and is of very uneven quality.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 307.

Hinckley, J. F., presents some observations on the recovery of glycerin from soap lyes and the purification of the resulting crude glycerin.—*J. Soc. Chem. Ind., Lond.*, 1907, v. 26, p. 596.

An unsigned article discusses our dependence on foreign sources for crude glycerin, and points out that the latest government report gives the imports of crude glycerin for the eleven months ending last May as 35,061,779 pounds, representing a gain of nearly 4,000,000 pounds over the imports for the corresponding period last year.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 72, July 15, p. 9.

White, Edmund, gives a description of glycerin, a number of tests for possible contaminations, and calls attention to the trade varieties.—*Pharm. J., Lond.*, 1907, v. 25, p. 815.

Wiley, H. W., reports that 15 samples of glycerin were examined for the purpose of ascertaining to what extent the article as supplied on the market is contaminated with arsenic and other impurities; also for the purpose of determining whether or not the tests prescribed by the United States Pharmacopœia, eighth revision, are too rigid. It was found that very few samples could be secured which would fully comply with the standard.—*Ann. Rep. U. S. Dept. Agric.* for 1907, 1908, p. 392.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, pp. 23–24), found several samples of continental origin to show considerably more arsenium than is allowed by the *Ph. Brit.* They point out that the official arsenic test is liable to give discordant results in different hands, especially when the amount present closely approaches the limit.

Barnard, H. E., reports 8 samples of glycerin examined, 6 of which were below standard.—*Rep. Indiana Bd. Health*, 1907, p. 188.

Blome, Walter H. (com. on adulterations), reports on the examination of a number of samples of glycerin. Most samples contained either butyric acid, or mineral or carbonizable impurities in very small amounts. Specific gravity correct in all cases.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Caspari, Chas. E. (com. on adulterations), examined 16 samples; 2 satisfactory; 14 contained butyric acid.—*Proc. Missouri Pharm. Ass.*, 1907, p. 142.

Sayre, L. E., reports finding traces of sugar, butyric acid, acrolein, sulphates and iron in various samples of glycerin.—*Bull. Kansas Bd. Health*, 1907, p. 12.

Kline and Graham assert that they have not been able to find commercial glycerin free from butyric ether.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 85.

Lücher, Edward, asserts that commercial glycerin invariably contains butyric acid.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 1045.

Bergh, Gustaf Fr., discusses the organic acids found in glycerin, describes their origin and composition, and outlines methods for their determination.—*Svensk. Farm. Tidskr.*, 1907, v. 11, pp. 261–270, 280–285, 301–307.

Ossendowski (C. R. Soc. Chim. Russ.), reports observations on the solvent action of glycerin.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 807.

Kirchgessner, William C., discusses the comparative advantages of glycerin and syrup as a vehicle, preservative or solvent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 159–161.

Jamieson, W. Allan, states that glycerin is the excipient par excellence, while irritant when applied alone, if combined with starch, it forms a bland, persistent, soothing and softening medium, and when used early and persistently may effect a cure of ichthyosis.—*Brit. M. J.*, 1907, v. 1, p. 364.

Graef, Charles, states that glycerin with a little carbolic acid added is probably the best remedy which can be used for dropping in the ear in middle-ear disease. Laudanum and olive oil, which are commonly used, can have little benefit and they have the disadvantage of fouling the ear and promoting the development of bacteria when rupture of the drumhead occurs.—*N. York M. J.*, 1907, v. 86, p. 151.

Additional references to the use of glycerin will be found in the *Index Medicus* and the *J. Am. M. Ass.*

GLYCERITA.

GLYCERITUM FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.

Mittelbach, Wm., thinks there is no special necessity for a glycerite of iron, quinine, and strychnine phosphate, since the elixir can readily be mixed with glycerin.—*Proc. Missouri Pharm. Ass.*, 1907, p. 131.

Cohn, Alfred I., thinks this a superfluous preparation, as the syrup of the phosphate of iron, quinine, and strychnine can easily be made directly by a modified formula which he suggests.—Proc. New York Pharm. Ass., 1907, p. 234.

McElhenie, T. D., called attention to the glycerite of phosphates of iron, quinine, and strychnine of the U. S. P. which he believes to be an unsatisfactory preparation, as it tends to precipitate or to form a solid magma.—Am. J. Pharm. Phila., 1907, v. 79, p. 297.

GLYCYRRHIZA.

Lloyd, John Uri, discusses the occurrence of the licorice plant, its collection, and the production of extract of licorice in the valley of the Meander and of the Hermes in Asia Minor.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 336.

Rittenhouse, Daniel S., discusses the cultivation of glycyrrhiza and describes a specimen grown in a back yard in Philadelphia.—Am. J. Pharm. Phila., 1907, v. 79, pp. 39–41.

Harris, E. L., gives some interesting information relative to the licorice root industry of Asiatic Turkey, the method of collection, and marketing.—Pharm. J. Lond., 1907, v. 25, p. 394.

Stscherbatscheff, D., describes and figures the fruit of glycyrrhiza and its structural characteristics; also describes the development of the seed and of the root.—Arch. d. Pharm., 1907, v. 245, pp. 54–60.

Knowaleu, S. G., (Dissertation, St. Petersburg) reports an examination of Asiatic glycyrrhiza, *Glycyrrhiza uralensis*, which is found in Siberia, Turkestan, and Mongolia. He concludes that this Asiatic glycyrrhiza is of better quality than the best Spanish and is but little inferior to the best Russian licorice.—Chem. Report., Cöthen, 1907, v. 31, p. 588.

Tschirch and Cederberg review the efforts that have been made to isolate glycyrrhizin. They discuss the chemistry of the substance and record experiments to determine the nature of the combination in which glycyrrhizic acid is present in the drug.—Arch. d. Pharm., 1907, v. 245, pp. 97–111.

Heinrich Haensel (Half-Yearly Report, April, 1907, p. 18) points out that the oils from both Russian and Spanish licorice are dark, possessing the decided odor of the root in a most concentrated form.

Philipp Röder (Jahresbericht, Wien, 1907, p. 106) reports on 6 samples of glycyrrhiza which varied from 4.58 to 5.63 per cent of ash, and yielded from 31.62 to 40.61 per cent of aqueous extract.

Blome, Walter H., (com. on adulterations) points out that probably all powdered extract of licorice contains starch to keep it from lumping up. For that reason, and to comply with the law, it is labeled "compound" extract of licorice.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Gane, E. H., calls attention to the fact that powdered stick licorice is usually supplied when extract of glycyrrhiza is demanded. It contains of necessity some inert insoluble matter, usually starch, which is not to be considered an adulterant, as some official chemists are fond of declaring.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 327.

Scoville, W. L., says that extract of glycyrrhiza varies much in proportion of extractive matter. Of 16 samples one contained 77.8 per cent soluble matter; another 38.6 per cent, and the remainder between these figures. Starch is present in most samples.—*Ibid.*, v. 55, p. 327.

Baird, J. W., (com. on adulterations) reports on 18 samples of extract of glycyrrhiza; 5 genuine. 13 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 39.

Lythgoe, Hermann C., reports that 5 samples of extract of glycyrrhiza were all found to be adulterated with wheat starch.—*Rep. Massachusetts Bd. Health*, 1907, 1908, p. 379.

Scoville, W. L., asserts that a better-flavored syrup of glycyrrhiza can be made by percolating ground licorice root with a weak (0.1 per cent) solution of ammonium carbonate, evaporating to 450 cc. and dissolving 850 gms. of sugar in the liquid. This also makes a lighter-colored preparation.—*Drug. Circ.*, April, 1907, v. 51, p. 295.

Ferrel, O. L., makes a similar suggestion.—*Proc. Texas Pharm. Ass.*, 1907, p. 74.

GOSSYPHII CORTEX.

Blome, Walter H., (com. on adulterations) reports one sample of cotton-root bark which was quite woody.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

GOSSYPHIUM PURIFICATUM.

Boname, P., (Sta. Agron. Mauritius Bul. 15, pp. 17-22) presents a table giving the results of variety tests of cotton in Mauritius.—*Exp. Sta. Rec.*, 1906-7, v. 18, p. 930.

Allard, H. A., figures and discusses the fibers of long staple upland cotton, discusses the uniformity of cotton fibers, the apparent lack of uniformity and its occurrence, and the true nature of the long fibers.—*Bull. Bur. Plant Ind.*, U. S. Dept. Agric., 1907, No. 111, pp. 13-16.

An abstract refers to the examination of 15 samples of purified cotton, only one of which yielded more ash than is permitted by the Ph. Germ. IV. The fatty matter, on the other hand, was relatively high, ranging from 0.32 to 0.98 per cent.—*Am. Druggist*, N. Y., 1907, v. 50, p. 136.

Gilmour, J. P., reports 3 out of 18 samples below Ph. Brit. standards; not purified from fatty matter.—*Year Book Pharm.*, Lond., 1907, pp. 446-455.

GRANATUM.

Caesar and Loretz (Geschäfts Ber., 1907, p. 84) discuss the assay of pomegranate root and the requirements made for this drug by various pharmacopœias. The Ph. Germ. IV requires 0.413 per cent and the Ph. Ndl. 0.25 per cent of alkaloids, while the Ph. Austr. VIII permits 10 per cent and the Ph. Ndl. 8–15 per cent of ash.

Philipp Röder Wien points out that the Ph. Austr. VIII limitation for ash in pomegranate is too low. Five out of six samples examined exceeded the 10 per cent ash content limit of the pharmacopœia, though none exceeded the 15 per cent limit proposed by Hauke.—Pharm. Post, Wien, 1907, v. 40, p. 337.

Caesar and Loretz (Geschäfts Ber., 1907, p. 18) point out that pomegranate bark shows considerable variation in the amount of the contained alkaloid, the bark of the trunk varying from 0.097 to 0.060 per cent and the bark of the root from 0.282 to 0.48 per cent.

An unsigned article quotes Caldwell and three manufacturers as giving the percentage of alcohol in the official fluid extract of pomegranate as 43, 45, 40, and 40 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

GRINDELIA.

Johnson, E. E., points out that the old settlers of California used grindelia as a remedy for inflammatory rheumatism, giving large quantities of decoction and applying poultices of the leaves.—Pacific Pharm., San Francisco, 1907–1908, v. 1, p. 414.

Farwell, O. A., reports that he has received a small California plant for grindelia, which upon examination proved to be one of the plants known in California as “tar weeds,” *Hemizonella minima*, A. Gr. The plant was only two or three inches in height and the inflorescence was very glutinous, giving it a faint resemblance to a very diminutive form of grindelia.—Drug. Circ., N. Y., 1907, v. 51, p. 460.

Power and Tutin report in detail chemical examination of grindelia, giving the methods employed and recording the results obtained.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 337–344.

Heinrich Haensel (Half-Yearly Report, April, 1907, p. 12) describes an oil from the dried herb of *Grindelia robusta*, obtained by distillation with high-pressure steam, 0.28 per cent, of a brown color and strong odor.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of grindelia as 71, 72, 60, 65, and 80 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

Webster, Herbert T., thinks that the local influence of *Grindelia robusta*, in various forms of ulceration and irritation of skin and

mucous membranes, gives it a merit probably not equaled by any other remedy in the materia medica.—*Eclectic M. J.*, 1907, v. 67, pp. 68-72, 121-125.

GUAIACOL.

Kahn, Joseph, outlines tests to distinguish guaiacol from creosote.—*Proc. New York Pharm. Ass.*, 1907, p. 242.

Blome, Walter H., (com. on adulterations) reports the examination of guaiacol which did not respond to the U. S. P. tests.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Caspari, Chas. E., (com. on adulterations) examined 5 samples, 4 satisfactory; 1 contained creosote.—*Proc. Missouri Pharm. Ass.*, 1907, p. 145.

The editor of the "therapeutical notes" quotes Ragorzi, *Bulletin général de thérapeutique*, who advises the use of an ointment of guaiacol in the treatment of mumps.—*N. York M. J.*, 1907, v. 86, p. 409.

GUAIACUM.

Gausby, R. A., reports that there is no difficulty in securing a fine article of guaiac of U. S. P. quality.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 75.

Hankey, W. T., examined guaiac resin containing from 2½ to 29 per cent of insoluble matter and from 0.5 per cent to 6.4 per cent of ash.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 325.

Gane, E. H., reports on examination of 5 samples and found the percentage of matter insoluble in alcohol to vary from 1.2 per cent to 20.7 per cent, and the ash content from 0.14 per cent to 5.19 per cent.—*Ibid.*, v. 55, p. 325.

Patch, E. L., reports a specimen of guaiac resin, 24 per cent insoluble in alcohol; 4.2 per cent ash; acid No. 78.—*Ibid.*, v. 55, p. 325.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 24) examined four samples ranging from 10.46 to 24.76 per cent of matter insoluble in alcohol; from 2.4 to 5.1 ash, and having a saponification value of from 63.5 to 70. Three gave 1.3, 1.5, and 1.1 solubility in petroleum spirit. The fourth was practically insoluble in alcohol.

Blome, Walter H., (com. on adulterations) reports one sample of guaiac resin containing 22.62 per cent of matter insoluble in alcohol.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Niece, Frederic E., describes a color reaction for testing the identity of tincture of guaiac.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 483.

GUARANA.

Nelson, Burt E., gives the origin of guarana and describes the appearance of the drug and its powder; also calls attention to the

characteristic appearance of the drug under the microscope.—Merck's Report, N. Y., 1907, v. 16, p. 220.

Puckner, W. A., reviews the literature of 1906, relating to the assay of guarana.—Pharm. Rev. Milwaukee, 1907, v. 25, p. 321.

Vanderkleed, Charles E., (com. on adulterations) reports the examination of two samples of guarana assaying 4.700 and 4.080 per cent, respectively. He remarks that the quality is very good, but that the drug is hard to exhaust.—Proc. Pennsylvania Pharm. Ass., 1907, p. 88.

Gane, E. H., examined 6 lots which varied from 4.1 per cent to 4.64 per cent of alkaloidal principles.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 326.

Patch, E. L., examined 2 lots assaying 4.1 per cent and 3.4 per cent, respectively.—*Ibid.*, v. 55, p. 326.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of guarana as 48.9, 48, 60, 65, and 40 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

HAMAMELIDIS FOLIA.

A news item discusses the value of witch-hazel brush and the amount used in the manufacture of distilled extract of witch hazel.—Pharm. Era., N. Y., 1907, v. 37, p. 125.

Kramer, Hans, describes and illustrates the structural characteristics of the leaf of hamamelis. He includes a table in which he enumerates the amount of ash found in various leaf and flower drugs.—Ber. d. pharm. Gesellsch., Berl., 1907, v. 17, pp. 323–325.

Scoville, Wilbur L., reports a study of an oil, or a fatty substance, having a strong odor of witch hazel, obtained in the distillation of that drug.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 448–449.

AQUA HAMAMELIDIS.

Barnard, H. E., reports seven samples of witch hazel examined, six of which were U. S. P., and one was below standard, and contained formaldehyde. Barnard concludes that the use of formaldehyde as a preservative in witch hazel is evidently somewhat common.—Rep. Indiana Bd. Health, 1907, p. 189.

Lythgoe, Hermann C., reports that one sample of witch hazel extract out of the 42 examined was found to be adulterated. It contained formaldehyde. All the samples examined during the year were free from wood alcohol.—Rep. Massachusetts Bd. Health, 1907, 1908, p. 379.

The N. Y. State Board of Health, Eastern Branch, reports 80 samples, 4 deficient.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 331.

The Amer. Druggist reports many samples in Buffalo found deficient.—*Ibid.*, v. 55, p. 331.

Scoville, W. L., states that it varies in alcohol from 13.5 to 15.1 per cent.—*Ibid.*, v. 55, p. 331.

HEDEOMA.

Bennett, J. G., describes and figures an apparatus used by him in the preparation of oil of pennyroyal. He finds that the stems and the roots constitute 16 per cent of the plant and contain no oil. The total yield of oil from the plant is 0.166 per cent, so that the yield from the leaves and tops would be 0.198 per cent.—*Mdl. Drug., Columbus*, 1906-7, v. 8, p. 213.

HEXAMETHYLENAMINA.

Schlotterbeck, J. O., outlines the making of hexamethylenamine and points out that this is a simple condensation resulting from the mixture of stronger water of ammonia and solution of formaldehyde, according to the following equation: $4\text{NH}_3 + 6\text{CH}_2\text{O} = (\text{CH}_2)_6\text{N}_4 + 6\text{H}_2\text{O}$. This is one of the simplest illustrations of synthesis.—*Bull. Pharm.*, 1907, v. 21, p. 330.

Base, Daniel, reports a comparative study of various samples of hexamethylene-tetramine, some of them sold under trade names at fancy prices, and finds that there is practically no difference in composition or purity.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 469-472.

A contributor to the "Pharmacology" column calls attention to the various names under which hexamethylenamine is sold and the claims of each of these concerning superiority. Daniel Base has examined a number of commercial samples as well as those sold under proprietary names, and finds that they are practically uniform in strength and purity, hence the substance may be safely prescribed by the official name.—*J. Am. M. Ass.*, 1907, v. 49, p. 1295.

Abt, I. A., discusses urinary infection in children and states that urotropin is by far the best medicinal treatment. Salol may be used with urotropin or alone.—*Ibid.*, v. 49, pp. 1972-1975.

The paper was discussed by A. C. Cotton, Edwin E. Graham, J. L. Morse, J. H. M. Knox, E. W. Mitchell, L. Bourse, and Isaac A. Abt.

HUMULUS.

A news note points out that at the present time American hops are the subject of invidious discrimination in many markets, due to the supposed lack of certain desired qualities. A preliminary investigation of the condition of growing, curing, and handling the product has been made and the conclusion reached that the quality could be much improved by better methods of curing and cleaner picking. Accordingly, a study of the problems of curing has been mapped out

and is now in progress in the hop districts of the Pacific coast.—Oil, Paint, and Drug Reporter, N. Y., 1907, v. 71, March 25, p. 25.

Merrit, E., (U. S. Dept. Agr. Bur. Statis, Bul. 50, pp. 34, dgm. 1) reports the production of hops in the United States from 1850-1900, and annual production and commercial movement of this product from 1889-1905, together with the localization of the production in this and European countries.—Exp. Sta. Rec., 1906-7, v. 18, p. 1040. (See also *ibid.*, p. 1078.)

Gehe & Co. (Handels-Bericht, 1907, p. 25) present some figures on the production of hops in various countries during the year 1906, showing a general decrease in production in all countries but the United States. (See also Bull. Pharm., 1907, v. 21, p. 80.)

Coez, G., (Bull. Soc. Chim. du Nord, through Annales de Chim. Analyt., 1906, 11, 466) outlines a method for the valuation of hops by determining the amount of benzol extract, which he believes to be a valuable criterion of the quality of brewer's hops.—Pharm. J. Lond., 1907, v. 24, p. 293.

Stockberger, W. W., (U. S. Dept. Agr. Bur. Plant Indus. Bul. 121, pp. 41-46) mentions investigations on the sources of arsenic in certain samples of dried hops and gives the several conclusions reached.—Exp. Sta. Rec., 1907-8, v. 19, p. 1007.

HYDRARGYRI CHLORIDUM CORROSIVUM.

Kof and Haehn outline a possible method for the detection of minute quantities of mercuric chloride which depends on the effect of the mercuric salt in inhibiting the reduction of the silver bromide in photographic plates.—Arch. d. Pharm., 1907, v. 245, pp. 529-533.

Sauboumatsu, S., outlines a method for the quantitative estimation of sublimate which depends on the deposition of mercury on a clean copper wire.—J. Pharm. Soc., Japan, 1907, p. 753.

Schuyten, M. C., (Antwerp. Chem.-Ztg., 31, 1135) has found that for mercuric halides, iodine, and bromine to a certain extent can displace chlorine from HgCl_2 , in aqueous as well as in ethereal solution.—Chem. Abstr. Am. Chem. Soc., 1908, v. 2, p. 931.

Herz and Anders (Chem. Inst. Univ. Breslau, Z. anorg. Chem., 52, 164-172) determined the solubilities at 25° of mercuric chloride, iodide, bromide, and cyanide in mixtures of varying amounts of methyl alcohol and water, ethyl alcohol and water, and ethyl acetate and water.—*Ibid.*, v. 1, p. 955.

Klose, G., reports that adeps lanæ will dissolve 1.53 per cent of mercuric chloride.—Arch. internat. de Pharmacod. et de Thérap., 1907, v. 17, p. 461.

Sabbatani, L., discusses the use of hydrogen sulphide as a general antidote for mercuric salts, particularly corrosive mercuric chloride.—*Ibid.*, v. 17, pp. 318-341.

Hausmann, W., discusses the possibility of acquired immunity to corrosive sublimate and points out that so far as known no experimental work in this connection is available.—*Ergeb. d. Physiol.*, 1907, v. 6, p. 88.

Maurel and d'Orel discuss the influence of the paths of administration (gastric, hypodermic, intravenous, etc.) on the minimum lethal dose of bichloride of mercury.—*Compt. rend. Soc., de biol. Par.*, 1907, v. 63, pp. 21–23. (See also under *Sparteinae sulphas* and *Quininae hydrobromidum*.)

Manwaring and Ruh discuss the effect of certain surgical antiseptics and therapeutic agents on phagocytosis, report a number of observations, and conclude that mercuric chloride in concentrations less than $\frac{1}{16}$ per cent causes a transient stimulation in phagocytosis, followed by a depression. In larger amounts it causes a permanent depression from the first, phagocytosis apparently completely ceasing soon after the concentration reached $\frac{1}{16}$ per cent.—*J. Expr. M.*, N. Y., 1907, v. 9, pp. 473–486.

Blake, Irwin W., details a case of poisoning by corrosive sublimate which was unusual on account of the absence of typical symptoms.—*J. Am. M. Ass.*, 1907, v. 48, p. 2137.

The editor of the "Therapeutics" column states that the *Pharmaceutical Journal*, April 6, calls attention to the fact that mercuric chloride and potassium iodide are often ordered together in solution and that this is a precipitant for alkaloids which are sometimes ordered in the same mixture.—*Ibid.*, v. 48, p. 2206.

Martinet, A., (*Presse méd.*, Paris, v. 15, No. 91) does not approve of giving mercury by the mouth as a rule, but if required glycerin may be added to prevent drying of the pills. He adds opium to increase the tolerance of the intestines for the bichloride.—*Ibid.*, v. 49, p. 2043.

Lydston, G. Frank, discusses the intravenous treatment of syphilis and states that a patient may be brought under the mercurial influence within forty-eight hours by this means. He states that his experience with the method is limited and he does not advise it as a routine method of treatment.—*Ibid.*, v. 49, pp. 1662–1663.

Guernsey, Joseph C., discusses the indications for "mercurious corrosivus" and asserts that this powerful ally is often entirely overlooked in the search for a remedy to cure the urinary symptoms in which it is indicated, and usually the routine prescriber thinks of cantharis, or cannabis sativa, or some other remedy, which failing, he flies the track and gives buchu or saw palmetto in full quack doses—meanwhile his good friend mercurius corrosivus stands waiting.—*Hahnemann. Month.*, Phila., 1907, v. 42, p. 59.

Raue, C. Sigmund, employs the bichloride, in the third decimal trituration, in cases of syphilis associated with intestinal disturb-

ances when the mucous membrane of the mouth is in an unhealthy condition.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 527.

Grelat, M. P., (*J. pharm. chim.*, 6, 25, 423–428) states that the use of mercuric chloride to preserve milk which is to be analyzed has many advantages. In the proportion of 0.2 gm. per liter it preserves the milk intact up to ten days.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1588.

HYDRARGYRI CHLORIDUM MITE.

Beckmann, Ernst, discusses the chemical formula for mild mercurous chloride, reports a number of experiments, and concludes that the formula Hg_2Cl_2 is undoubtedly correct.—Ztsch. f. anorg. Chem., 1907, v. 55, p. 178.

Burdon-Cooper, J., (*Lancet*) calls attention to a crystalline modification of calomel first isolated by Meyer in 1905, and describes its method of manufacture.—Chem. & Drug, Lond., 1907, v. 70, p. 909.

An abstract discusses Japanese calomel, its origin and method of manufacture, and points out that although the process seems occult the product has some very valuable properties which should make it a desirable calomel behind the prescription counter.—Nat. Druggist, St. Louis, 1907, v. 37, p. 271.

An abstract outlines the following test for metallic mercury in calomel: 1 gm. of the suspected material is shaken with 10 cc. of a mixture of equal parts of nitric acid (25 per cent) and water, filtering and treating the filtrate with hydrogen sulphide. No blackening should result. This diluted nitric acid is said not to attack calomel, though it dissolves any free mercury present.—Am. Druggist, N. Y., 1907, v. 50, p. 136.

Caspari, Chas. E., (com. on adulterations) examined 37 samples; 30 satisfactory; 7 contained traces of corrosive sublimate.—Proc. Missouri Pharm. Ass., 1907, p. 143.

Blome, Walter H., (com. on adulterations) asserts that many samples of calomel contain a trace of bichloride.—Proc. Michigan Pharm. Ass., 1907, p. 67.

Vandermeulen, A., reports examining a number of ampoules of calomel which were said to contain 0.10 gm. of calomel in each cc. He found 0.036, 0.031 and 0.023 gm., respectively.—Ann. de pharm. Louvain, 1907, v. 13, pp. 97–98.

Carracido, José R., reports a study on the supposed incompatibility of calomel with sodium chloride. He concludes that the corrosive chloride of mercury is produced, but in quantities below the ordinarily toxic dose. The fact that poisoning has occurred the author believes to be due to the presence of colloidal mercury produced by the action of the alkaline secretions, albumin, hæmoglobin, and the protoplasm of the cell.—Apoth. Ztg., Berl., 1907, v. 22, p. 5.

Hyman, Samuel M., reports a case of gonorrhœa of the mouth and states that the treatment included the use of calomel at bedtime, with local applications of silver nitrate solutions in increasing concentration.—*N. York M. J.*, 1907, v. 85, p. 169.

Newman, A. J., calls attention to the use of calomel in amounts larger than are necessary and states that he uses doses of one-tenth grain for the dry tongue seen in typhoid fever, and one-half grain doses with santolin for worms in children.—*J. Am. M. Ass.*, 1907, v. 49, p. 2030.

Marrs, W. T., states that no time should be lost in administering calomel in the treatment of phlegmasia dolens. The calomel acts as an antiseptic and stimulates every secretion.—*N. York M. J.*, 1907, v. 85, p. 602.

Lloyd cites Motherby's Medical Dictionary, 1775, as authority for the administration of a pound and a half of calomel in twenty-four hours in the treatment of yaws.—*Eclectic M. J. Cincin.*, 1907, v. 67, p. 382.

HYDRARGYRI IODIDUM FLAVUM.

Beckmann, Ernst, reviews some of the literature relating to the chemical composition of the mercurous haloids, reports a number of observations, and asserts that from his experiments both the mercurous bromide and the mercurous iodide have the double molecular formula.—*Ztsch. f. anorg. chem.*, 1907, v. 55, pp. 181-184.

Deming, Ralph, considers the protoiodide of mercury as the most useful form in the treatment of syphilis by mouth, though this, he believes, is the least effective method of employing mercury.—*Hahnemann. Monh. Phila.*, 1907, v. 42, p. 428.

Raue, C. Sigmund, recommends *mercurius iodatus flavus* 2-x trituration, two grains three or four times daily, to be given in ordinary cases of syphilis. Later, if ulcerative lesions predominate, he prefers the red iodide.—*Tr. Am. Inst. Homoeop.*, 1907, 63rd session, p. 527.

HYDRARGYRI IODIDUM RUBRUM.

Orlow, N. A., (*Chem. Zeit.*, 1906, 30, 1301) discusses some reactions of mercuric iodide.—*Analyst London*, 1907, v. 42, p. 129.

Durrin, A., (*Compt. rend.*, 145, 713) has prepared the following compounds: $\text{FeI}_2 \cdot 2\text{HgI}_2 \cdot 6\text{H}_2\text{O}$; $\text{HgO} + 2\text{AlI}_3 \cdot 3\text{HgI}_2 \cdot 15\text{H}_2\text{O}$, and $2\text{AlI}_3 \cdot 5\text{AgI} \cdot 2\text{AgO}$.—*Chem. Abstr.*, *Am. Chem. Soc.*, 1908, v. 2, p. 379.

Reichard, C., discusses the possible use of mercuric iodide as a reagent for the differentiation of the haloid salts of alkali metals.—*Pharm. Ztg.*, *Berl.*, 1907, v. 52, p. 221.

Davies, Seymour W., relates the circumstances of a case of poisoning with potassium mercuric iodide, with recovery under treatment.—*Brit. M. J.*, 1907, v. 2, p. 1775.

Raue, C. Sigmund, recommends the red iodide of mercury in cases of syphilis where ulcerative lesions predominate.—*Tr. Am. Inst. Homœop.*, 1907, 63rd session, p. 527.

HYDRARGYRI OXIDUM FLAVUM.

Smith, J. Beddall, asserts that out of 10 samples only one gave less than 0.5 per cent of ash, the other ranging from 0.83 to 1.66 per cent. He calls attention to the *Ph. Brit.* requirements for yellow oxide of mercury and suggests that the monograph should be revised and standards fixed as has been done in the *U. S. P. VIII.*—*Pharm. J. Lond.*, 1907, v. 24, p. 129.

Philipp Röder Wien, reports that of 2 samples of yellow oxide of mercury examined, one was evidently not prepared by precipitation.—*Ztschr. d. Allg. österr. Apoth.-Ver.*, Wien, 1907, v. 45, p. 269.

The inspectors of pharmacies point out that the ointment of yellow mercuric oxide is frequently not sufficiently homogeneous.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 377.

Marshall, Luther, points out the need for a thoroughly well triturated yellow oxide of mercury before incorporating it into an ointment and suggests the use of a few drops of oil of sweet almonds added to the oxide in a mortar or on a pill tile, and rubbing up well before adding the solid fat.—*Bull. Pharm.*, 1907, v. 21, p. 379.

HYDRARGYRI OXIDUM RUBRUM.

Caspari, Chas. E., (com. on adulterations) examined 16 samples, all contained traces of nitrate.—*Proc. Missouri Pharm. Ass.*, 1907, p. 145.

HYDRARGYRUM.

Rupp, E., discusses his proposed method for the iodometric estimation of mercuric salts by precipitating with alkaline formaldehyde solution and dissolving the resulting precipitate with N/10 iodine solution. He points out that one of the essential features of the latter part of the process is that the mixture be actively shaken for from one to two minutes.—*Ber. d. deut. chem. Gesellsch.*, 1907, v. 40, III, p. 3276.

Désesquelle, presents a tabulated statement of the assay of mercurial preparations for hypodermic injection.—*Répert. de pharm.*, Par., 1907, v. 19, p. 519.

Robertson, P. W., describes a volumetric method of estimating mercury which he thinks accurate, rapid, and applicable to mercurous salts by first boiling with nitric acid and then diluting.—*Chem. News, Lond.*, 1907, v. 95, pp. 254–255. (See also *Pharm. J. Lond.*, 1907, v. 24, pp. 745–746.)

Pépin, Camille, contributes some practical notes on gray oil.—*J. de pharm. et de chim., Par.*, 1907, v. 25, pp. 283-286.

Lafay, presents a new formula for gray oil.—*Ibid.*, v. 25, p. 320. (See also v. 26, pp. 491-498.)

Dumesnil, apropos of the above, presents a further discussion of "injectable" oils, especially gray oil, together with a committee report on the latter.—*Ibid.*, v. 26, pp. 529-534, 534-536.

Sabbatani, L., discusses sulphuric acid as a general antidote to mercury, from the standpoint of physico-chemistry.—*Arch. internat. de pharmacod. et de therap., Par.*, 1907, v. 17, pp. 319-341.

Fiessinger, Noel, discusses the renal and hepatic lesions in the course of mercurial intoxication; one plate, four figures.—*J. de physiol. et de path. gén., Par.*, 1907, v. 9, pp. 470-480. An abstract is also given in *Compt. rend. Soc., de biol., Par.*, 1907, v. 62, pp. 240-242.

Bartsch (München. med. Wehnschr., Oct. 22) reports four deaths resulting from the mercurial treatment of syphilis. In three of the cases the mercury was injected, and in the fourth it was used by inunction.—*N. York M. J.*, 1907, v. 86, p. 946.

Salmon, Paul, discusses the influence of local anæsthesia on the pain consecutive to injections of soluble salts of mercury.—*J. de pharm. et de chim., Par.*, 1907, v. 25, p. 216.

Pernet, George, discusses the use of mercury in different forms and ways in the treatment of syphilis.—*Brit. M. J.*, 1907, v. 1, pp. 730-735.

Bernart, William F., discusses the values of different mercurial preparations with the time required for obtaining parallel results by different modes of administration, including inunction, intravenous, intramuscular, and internal.—*N. York M. J.*, 1907, v. 86, p. 263.

Raue, C. Sigmund, points out that mercury may ordinarily be given by the mouth, but when the symptoms are urgent, as they frequently are in the hereditary form of the disease, we must get a quick action of the drug if we wish to save the case. For this purpose inunctions of mercurial ointment three times daily may be employed. More recently he has been impressed with the superiority in desperate cases of the hypodermatic injection of mercury.—*Tr. Am. Inst. Homoeop.*, 1907, 63rd session, p. 527.

For additional references on the use of mercury see *Index Medicus* and the *J. Am. M. Ass.*

HYDRARGYRUM AMMONIATUM.

Schmidt, Ernst, discusses the chemistry of ammoniated mercury and reports some experiments to determine the action of methyl iodide on white precipitate.—*Ztschr. d. Allg. österr. Apoth.-Ver.*, Wien, 1907, v. 45, pp. 541-543.

Rupp and Lehmann outline a method for the acidimetric determination of ammoniated mercury by dissolving in water with the aid of potassium iodide and titrating the solution with N/10 solution of hydrochloric acid, using an alcoholic solution of methyl orange as an indicator.—*Pharm. Ztg.*, Berl., 1907, v. 52, p. 1014.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 82) reports on 11 samples of ammoniated mercury examined. Eight were rejected; 3 samples contained an excess of chloride, while 5 additional samples contained chlorides and rhodanides.

Caspari, Chas. E., (com. on adulterations) examined 5 samples; 3 satisfactory, 2 contained carbonate.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

HYDRARGYRUM CUM CRETA.

Cleland is reported as asserting that mercury with chalk, unless kept in well-corked or stoppered bottles, deteriorates, and gives reactions for mercuric compounds.—*Pharm. J. Lond.*, 1907, v. 24, p. 61.

Caspari, Chas. E., (com. on adulterations) examined 5 samples; 1 satisfactory; 4 contained oxides of mercury.—*Proc. Missouri Pharm. Ass.*, 1907, p. 144.

Gilmour, J. P., reports 2 out of 8 samples below Ph. Brit. standards; HgO present.—*Year Book Pharm. Lond.*, 1907, pp. 446-455.

HYDRASTINA.

Warren and Weiss describe and figure hydrastine picrolonate and discuss the use of picrolonic acid as a reagent for hydrastine.—*Journ. Biol. Chem.*, N. Y., 1907, v. 3, p. 337.

French, J. M., reviews the physiological action of hydrastine and compares its action and uses with strychnine.—*Merck's Arch.*, N. Y., 1907, v. 9, pp. 105-107.

Abogado, E. L., reviews the subject of hydrastine in uterine hæmorrhage.—*Crón. méd. mex.*, 1907, v. 10, pp. 14-16.

HYDRASTININÆ HYDROCHLORIDUM.

Riedels Berichte (Berlin, 1907, p. 66) describes the characteristic properties of hydrastinine picrate and suggests the determination of the melting point of this compound as a possible test for the identity of hydrastinine. The substance forms orange-yellow leaflets melting at 170° C.

Williams, William Whitridge, reports experiments to determine the effects of hydrastis and its alkaloids on blood pressure, and concludes that hydrastinine causes a rise of blood pressure above normal, which is usually preceded by a slight fall when injected intravenously. The rise is well sustained and is principally caused by

stimulation of the cardiac muscle.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, p. 197.

HYDRASTIS.

Henkel, Alice, describes and figures *Hydrastis canadensis* L., commonly known as yellow root, yellow puccoon, orange root, yellow Indian paint, turmeric root, Indian turmeric, Ohio curcuma, ground-raspberry, eye root, eye balm, yellow eye, jaundice root, Indian dye.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 31–33.

Dohme, A. R. L., expresses the belief that hydrastis is being manipulated and that the prevailing high price is not due, entirely at least, to a scarcity of the article. The quality is fair, many samples assaying much over 3 per cent of hydrastine.—D.-A. Apoth.-Ztg., N. Y., 1907, v. 28, p. 133.

Perrot, E., finds this drug adulterated by the addition of the roots of Monesia and of Plantain; and asks why its culture is not undertaken in France.—Bull. d. sc. pharmacol. Par., 1907, v. 14, p. 348.

Kollo, Constantin, suggests the use of Meyer's reagent for the quantitative determination of hydrastine in fluid extract of hydrastis. He does not consider the method as being absolutely accurate but believes that the approximate results obtained are sufficient indication of the value of any given preparation.—Pharm. Post, Wien, 1907, v. 40, pp. 912–914.

Matthes and Rammstedt discuss the application of picrolonic acid to the estimation of the alkaloid content of pharmaceutical preparations of hydrastis.—Arch. d. Pharm., 1907, v. 245, pp. 127–131.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 89) discuss the assay of hydrastis and the official requirements for fluid extract of hydrastis. The Ph. Belg. requires 20 per cent and the Ph. Austr. 25 per cent of dry extract. The Ph. Germ., Ph. Ndl., and the U. S. P. all require 2 per cent of hydrastine.

Puckner, W. A., reviews the work done in 1906, on the assaying of hydrastis.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 324.

Heyl, Georg, replies to the criticisms made by van der Haar, of his modification of the Ph. Germ. assay for hydrastis and compares this method with the modification of the Rusting-Smeets method proposed by van der Haar. He concludes that the latter method and also the method of the Ph. Ndl. give results that are too low.—Apoth. Ztg., Berl., 1907, v. 22, pp. 907–908.

van der Haar, A. W., discusses the results obtained by Heyl and re-asserts that the method as outlined will give correct results.—*Ibid.*, v. 22, p. 1058.

Hankey, William T., asserts that his experience with hydrastis has been very satisfactory. The rhizome usually yields from 2.75 to

3 per cent hydrastine, which is better than 2.5 per cent required by the U. S. P. VIII.—Proc. Pennsylvania Pharm. Ass., 1907, p. 70.

Blome, Walter H., (com. on adulterations) reports that golden seal generally assays high.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Gausby, R. A., points out that hydrastis has been particularly good during the past year, some samples assaying as high as 3.072 per cent of hydrastine.—Proc. Pennsylvania Pharm. Ass., 1907, p. 73.

Sayre, L. E., reports on 18 assays of hydrastis which yielded from 1.55 to 2.95 per cent of hydrastine. Average 2.24 per cent.—Bull. Kansas Bd. Health, 1907, p. 44.

Vanderkleed, Charles E., reports 11 assays of hydrastis ranging from 2.5 to 4.4 per cent.—Proc. Pennsylvania Pharm. Ass., 1907, p. 89.

Spindler reports that 6 out of 17 samples of fluid extract of hydrastis examined were unsatisfactory. Three additional samples barely complied with the Pharmacopœial requirements.—Suedd. Apoth. Ztg., 1907, v. 17, p. 50.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 50) found the hydrastine content of the better grades of hydrastis to vary from 2.68 to 4.04 per cent.

Philipp Röder (Jahresbericht, Wien, 1907, p. 104) reports on 11 samples of hydrastis which varied from 3.19 to 8.93 per cent of ash and from 2.16 to 2.86 per cent of hydrastine.

Lisin, F., reviews the literature and records some additional observations on the cardio-vascular influence of hydrastis.—Arch. internat. de Pharmacod. et de Thérap., 1907, v. 17, p. 480.

Kinyon, C. B., points out that hydrastis is indicated more for diseased conditions manifesting themselves between the menses than for disorders of menstruation.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 386.

Adams, E. O., points out that hydrastis is a useful remedy in gastro-enteric diseases where there is much mucus,ropy in character.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 369.

Williams, William Whitridge, reports experiments to determine the effects of hydrastis and its alkaloids on blood pressure, and concludes that the results of this investigation do not support the clinical theories concerning hydrastis.—Tr. Am. M. Ass. Sec. Pharm. and Therap., 1907, pp. 185-197.

HYOSCINÆ HYDROBROMIDUM.

Dohme and Englehardt point out that hyoscyne hydrobromide with the melting point 179.7° C. was often optically inactive and believe it is preferable to use a salt which has, in a 6.5 per cent aqueous solution in a 100 mm. tube at 15.8° C., a specific rotation of 25.5°. By this determination any adulteration with apoatropine will be shown.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 380.

Troxell, H. L., (com. on adulterations) points out that sometimes the optically inactive salt occurs with a melting point of 180° C. Although this salt is therapeutically as active as the United States Pharmacopœia salt, it had to be rejected on account of the U. S. P. melting point. Besides the melting point the U. S. P. should give in this case of the salt, to distinguish the two varieties, the optical rotation, this being for a $6\frac{1}{2}$ per cent solution in a 100 mm. tube about -25° .—Proc. Maryland Pharm. Ass., 1907, p. 86.

Thurston, Azor, asserts that hyoscine hydrobromide is *lævogyrate* in aqueous solution.—Merck's Report, N. Y., 1907, v. 16, p. 124. (See also under *Scopolaminæ hydrobromidum*.)

HYOSCYAMUS.

Lyons, A. B., describes a spurious henbane which has recently appeared in our market "as coming from a new source of supply." He believes that the drug is derived from *Hyoscyamus muticus* L., which when grown in Egypt contains about the same proportion of alkaloid as that of the spurious henbane.—Am. Druggist, N. Y., 1907, v. 51, p. 390.

An editorial comments on a spurious henbane described by A. B. Lyons, which is found to contain 0.8 per cent of mydriatic alkaloids, or about ten times the total quantity present in the official *Hyoscyamus niger*.—*Ibid.*, v. 51, p. 385.

Philipp Röder Wien outlines a method for the determination of mydriatic alkaloids in hyoscyamus and calls attention to the fact that the Ph. Austr. VIII prescribes an extract content and a limit of ash but no alkaloid content.—Ztschr. d. Allg. österr. Apoth. Ver., Wien, 1907, v. 45, p. 254.

Sayre, L. E., reports on 21 assays of hyoscyamus which yielded from 0.05 to 0.14 per cent of total alkaloids. Average 0.09 per cent.—Bull. Kansas Bd. Health, 1907, p. 44.

Blome, Walter H. (com. on adulterations), reports that hyoscyamus frequently assays low. One sample examined contained sand, dirt, feathers, gravel, and straw.—Proc. Michigan Pharm. Ass., 1907, p. 68.

Vanderkleed, Charles E., (com. on adulterations) reports 1 sample of henbane leaf assaying 0.070 per cent.—Proc. Pennsylvania Pharm. Ass., 1907, p. 88.

Caspari, Chas. E., (com. on adulterations) examined 3 samples, all weak.—Proc. Missouri Pharm. Ass., 1907, p. 147.

Gane, E. H., reports the examination of 12 lots which assayed from 0.04 per cent to 0.12 per cent. One sample of tops of *Hyoscyamus muticus* assayed 1.1 per cent of alkaloids. This should be worth cultivating instead of *Hyoscyamus niger*.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 326.

Patch, E. L., examined 9 lots varying from 0.0436 to 0.073 per cent.—*Ibid.*, v. 55, p. 326.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 24) examined 3 samples of extract of hyoscyamus of English make which yielded .05, .04, and .04 per cent respectively of alkaloid.

Philipp Röder (Jahresbericht, Wien, 1907, p. 56) found that the 5 samples of extract of hyoscyamus examined varied from 0.225 to 0.314 per cent of alkaloids.

Kouffeld, J. Q., reports an examination of extract of hyoscyamus and outlines a method for preparing a water soluble extract of hyoscyamus.—Pharm. Weekbl., 1907, v. 44, pp. 997-1000.

The committee of reference in pharmacy points out that the international extract of hyoscyamus is, in all probability, an inconvenience and may even be a source of danger unless properly standardized.—Chem. & Drug. Lond., 1907, v. 70, p. 587.

Rosenberger, A. S., points out that hyoscyamus is a remedy that has served him well. The cough may have commenced in a case of influenza or have been produced by some other cause. The patient is strictly nervous and has an aggravation of cough on lying down.—Tr. Am. Inst., Homœop., 1907, 63rd session, p. 420.

INFUSA.

Farr and Wright discuss the preparation of concentrated infusions by repercolation and macero-expression, and present a number of formulas for concentrated infusions, the preparation being directed to be preserved by the addition of a small percentage of alcohol or by chloroform.—Pharm. J. Lond., 1907, v. 24, pp. 621-622.

IODOFORMUM.

Mitchell, Edward, points out that iodoform is frequently below the standard. His firm this year returned to manufacturers two lots of this chemical.—Proc. Arkansas Pharm. Ass., 1907, p. 90.

Gerrard, A. W., outlines methods for the preparation and preservation of iodoform cotton and gauze; also outlines methods for the detection of adulteration of iodoform surgical dressings.—Pharm. J. Lond., 1907, v. 25, pp. 674-675.

Klose, G., found that adeps lanæ dissolves approximately 5 per cent of iodoform at 45° C.—Arch, internat. de Pharmacod. et de Thérap., 1907, v. 17, p. 463.

Taltavall and Gies (N. Y. M. J., etc., 1907, 84, 726) report absence of iodine from the liver in a case of iodoform poisoning.—Reference from Index Medicus, 1907, v. 5, p. 1154.

Diesing (Deutsche med. Wehnschr., Berl. u. Leipz., v. 33, No. 20) reports the use of iodoform in olive oil for injection in the treatment of leprosy. He reports that in his experience all mild,

uncomplicated cases of leprosy and a large percentage of the severe cases, are cured by this method. The technic is given.—*J. Am. M. Ass.*, 1907, v. 49, p. 286.

Meurers (*Beitr. z. klin. Chir., von Bruns' Tübingen*, v. 56, No. 1) details the use of Mosetigs iodoform filling in 45 cases of extensive bone defect. It was found extremely valuable.—*Ibid.*, 1908, v. 50, p. 321.

An obituary notice of Mosetig states that he introduced iodoform into surgery in 1880.—*N. York M. J.*, 1907, v. 85, p. 847.

IODUM.

An unsigned article describes the method of manufacturing iodine in Japan.—*Chem. & Drug. Lond.*, 1907, v. 71, p. 555.

Assendowski, A. M., (*Journ. d. russ. phys. chem. Ges.*, 1906, p. 1081) discusses the production of iodine in Japan and records the iodine content of the several specimens of plants that are used.—*Pharm. Ztg., Berl.*, 1907, v. 52, p. 169.

Frank, A., discusses the occurrence of iodine in the Stassfurt potash deposits and points out that the assumption that the potash deposits at Stassfurt are free from iodine is not well founded, in view of the fact that this deposit is evidently formed from sea water.—*Ztschr. f. ang. Chem., Berl.*, 1907, v. 20, p. 1279.

Charitschkow, K., (*Techn. Westnik*, 1907, p. 106) points out that the water accompanying the petroleum found in various parts of the world contains variable proportions of iodine and suggests that this source should be developed.—*Jahresb. d. Pharm. Göttingen*, 1907, 1908, v. 42, p. 133.

Tunmann discusses the widespread occurrence of iodine, reviews some of the literature, and outlines a method for quantitatively determining iodine in organic substances.—*Pharm. Zentrabl.*, 1907, v. 48, pp. 505-509.

Clarke, F. W., in the report of the international committee on atomic weights, says that Gallo has determined the atomic weight of iodine electrolytically, comparing the iodine liberated by a current with the silver deposited. His values range from 126.82 to 126.98, or, in mean, 126.89 when $Ag=107.93$. This result is more nearly in accord with the determination by Stas than with the later measurements.—*J. Am. Chem. Soc.*, 1907, v. 29, p. 109. (See also p. 252.)

Lewis and Wheeler discuss the electrical conductivity of solutions in fluid iodine and record a number of experiments on the conductivity of pure iodine.—*Ztschr. d. physik. Chem.*, 1907, v. 56, pp. 179-192.

Baxter, Hickey and Holmes contribute a paper on the vapor pressure of iodine.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 127-136.

Cormimbœuf, H., proposes a method for the estimation of true iodine in crude or sublimed iodine.—*Ann. de chim. analyt. Par.*, 1907, v. 12, p. 307.

Nishizaki, K., discusses the method of iodine estimation as outlined by Topf, and points out that this method gives better and more accurate results than any other methods.—*J. Pharm. Soc., Japan*, 1907, p. 751.

Seidell, Atherton, describes a new standard for use in the colorimetric determination of iodine consisting of an aqueous solution of Fuchsin S.—*Journ. Biol. Chem., N. Y.*, 1907, v. 3, pp. 391–393.

Kurbatow, V., discusses a new polymeric form of iodine from which he believes a new practical rule for the sublimation of iodine may be deduced.—*Ztschr. f. anorg. Chem.*, 1907, v. 56, pp. 230–232.

Patch, E. L., examined 7 samples ranging from 98.89 per cent to 100 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 326.

Bachman, Gustav, (com. on adulterations) reports iodine ranging from 97.15 to 92.8 per cent, instead of 99 per cent, as required.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 41.

Pouchet (*Courier Médical*) calls attention to certain incompatibilities of the iodides. He points out that they should not be prescribed with acids, the peroxides, or paraldehyde, all of which liberate iodine. Iodides are also incompatible with the heavy metals and they should not be given in connection with alkaloidal salts.—*Drug Topics*, New York, 1907, v. 22, p. 100.

Klose, G., found that adeps lanæ dissolves practically 5.50 per cent iodine at 45° C. when estimated according to the method of Carius.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, p. 462.

Rupp and Kost outline a method for determining the iodine content of ointments containing iodine or iodides.—*Suedd. Apoth. Ztg.*, 1907, v. 47, p. 244.

Greenish, Henry G., points out that the international agreement requires 1 in 10 of 95 per cent alcohol. All the pharmacopœias agree except the U. S., which requires 7 per cent.—*Pharm. J. Lond.*, 1907, v. 24, p. 833.

Bührer, C., points out that the U. S. P. is the only one of the recently published pharmacopœias that does not comply with the requirements of the international protocol.—*Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich*, 1907, v. 45, p. 419.

Mittlebach, William, criticises the U. S. P. formula for tincture of iodine and points out that dentists do not find the present preparation suitable for their work. He believes this fact should be brought to the attention of the committee on revision, as dentists use about as much tincture of iodine as any class of medical practitioners.—*Proc. Missouri Pharm. Ass.*, 1907, p. 52.

La Wall, C. H., reports experiments to determine the keeping qualities of tincture of iodine under varying conditions, and concludes that the U. S. P. formula for tincture of iodine yields a product that is permanent under practically all conditions.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 156-159.

Narbona, Luis, (*Gazeta Farmacéutica Española*, p. 86) reports experiments to determine the action of borax on tincture of iodine. He expresses the belief that the addition of borax does not reduce the activity of the tincture while it tends to neutralize the hydriodic acid that is formed and thus eliminates the irritating action frequently met with in old tinctures.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 521.

Hugenholtz, C., reports an investigation of tincture of iodine and its deterioration. His results appear to indicate that tincture of iodine keeps rather better in vials only partially filled, and preserved with access of light.—*Pharm. Weekbl.*, 1907, v. 44, pp. 218-220.

Barnard, H. E., reports that of 148 samples of tincture of iodine analyzed during the year, 88 were below standard, while 60 were pure, this being equivalent to a percentage of adulteration of 59.4 per cent.—*Rep. Indiana Bd. Health*, 1907, p. 193.

Lythgoe, Hermann C., reports 237 samples of tincture of iodine examined, 47 of which were adulterated.—*Rep. Massachusetts Bd. Health*, 1907, 1908, p. 385.

The N. Y. State board of health, eastern branch, reports 513 samples examined, 36 deficient.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 326.

The Mass. State board found six samples deficient; 61 per cent to 71 per cent of required amount.—*Ibid.*, v. 55, p. 326.

Baird, J. W., (com. on adulterations) reports on 173 samples; 76 genuine, 97 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

Blome, Walter H., (com. on adulterations) reports on a number of samples of tincture of iodine; none of the samples contained wood alcohol; all but one were more or less deficient in iodine.—*Proc. Michigan Pharm. Ass.*, 1907, p. 68.

Dunbar-Brunton, J., (*Brit. M. J.*, Nov. 16) states that if iodine be painted on to the skin in the dark and then exposed to a red light only, the part being then covered so as to exclude white light, absorption will take place rapidly, and there will be no discoloration or blistering even under prolonged use.—*J. Am. M. Ass.*, 1907, v. 49, p. 2041.

An unsigned abstract from *St. Louis Med. Rev.* states that in a solution of iodine varying from 0.2 to 1 per cent, we have a very potent germicidal agent, far superior to mercury bichloride.—*Dental Cosmos*, Phila., 1907, v. 49, p. 213.

Riddell, J. Scott, discusses the value of iodine in the sterilization of catgut.—*Brit. M. J.*, 1907, v. 1, p. 809.

Maberly, John, reports two cases of poisoning with carbolic acid, crude, in which iodine was used with alleged prompt relief.—*Lancet*, Lond., 1907, v. 173, p. 293.

Knowles, J., relates that in 1866 Dr. Powell demonstrated that rattlesnake virus mixed with iodine was nontoxic. When the virus and iodine were injected simultaneously near together, the animals survived.—*J. Am. M. Ass.*, 1907, v. 49, p. 1460.

Feigl, Johann, in his experimental research on the influence of medicaments on gastric secretion, makes a contribution to the knowledge of the action of iodine in promoting secretion.—*Biochem. Zeitschr. Berl.*, 1907, v. 8, pp. 466–519.

Loeb, Oswald, reports experiments to determine the distribution of iodine in the body following the use of various combinations of iodine.—*Arch. f. exper. Path. u. Pharmakol*, Liepz., 1907, v. 56, pp. 320–332.

Loeb and Fleischer studied the influence of iodine preparations on the vascular lesions produced by adrenalin, and state that these do not prevent the arterial lesions produced in the rabbit by adrenalin injections. No beneficial action was seen from the use of iodine.—*Am. J. M. Sc.*, Phila., 1907, v. 133, pp. 903–911.

Stewart, W. R., points out that the iodine patient is dark, emaciated, thin, and scrawny, with ravenous appetite. The glandular swellings are general and the glands are of ivory hardness.—*Tr. Am. Inst.*, Homœop., 1907, 63rd. session, p. 495.

IPECACUANHA.

Remington, Joseph P., reports that the U. S. P. standard for ipecac is *now* 1.75 per cent of ipecac alkaloids. Fluidextract of ipecac *now* 1.5 gm. alkaloid in 100 cc.—*Am. J. Pharm.* Phila., 1907, v. 79, p. 135.

Farwell, O. A., calls attention to a sample of "ipecac" from South America, from that section which produces ipecac. The roots are rather soft, of varying lengths, and of about the thickness of *Carthagenia ipecac*. An assay of the drug for alkaloids, according to the process given in the Pharmacopœia of the United States, gave negative results.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 459.

Puckner, W. A., reviews the literature of 1906 relating to the assay of ipecac.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 325.

Cæsar and Loretz (*Geschäfts Ber.*, 1907, p. 46) assert that the average alkaloid content of good quality of ipecac root is 2.5 per cent and question the advisability of reducing the already low (2 per cent) requirement of the U. S. P. to 1.75 per cent.

Spindler asserts that a good Rio ipecac always yields from 2.5 to 2.9 per cent of alkaloids in place of the 2 per cent required by the Ph. Germ. IV.—*Suedd. Apoth. Ztg.*, 1907, v. 47, p. 50.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907-8, p. 25) compared the alkaloidal content of three varieties by the U. S. P. method. Rio, 1.78 per cent total alkaloid; Jahore, 1.81 per cent, and Carthagena, 2.14 per cent total alkaloid.

Cæsar and Loretz (*Geschäfts Ber.*, 1907, pp. 100-101) outline their method of assay for ipecac and point out that the Ph. Ndl., Ph. Austr., Ph. Suec., and Ph. Belg., all require 2 per cent of alkaloids; the Ph. Germ. 2.03 per cent, the Ph. Helv. from 2.25 to 2.5 per cent, and that the U. S. P. has reduced its former requirement of 2 per cent to 1.75 per cent.

Bernardino, Peroni, reports studies and experiments on the distinguishing reactions of emetine. He outlines a test for emetine which depends on a peacock-blue coloration produced in sulphuric-acid solutions of potassium permanganate. A sulphuric-acid solution of iodic acid gives an orange-red color that gradually changes to orange-violet.—*Boll. chim. farm. Milano*, 1907, v. 46, pp. 273-280.

Naylor and Chappell review the assays of ipecac and record the results obtained with several different processes.—*Brit. & Col. Drug. Lond.*, v. 51, p. 258.

An unsigned article discusses the importation of ipecac into the United States and points out that the custom-house examiners have decided to exclude all importations that do not come up to the U. S. P. test of 2 per cent of total alkaloids. In an analysis of 12 samples, made by a certain importer, it was found that every one assayed below 2 per cent, although nearly all were above 1.75 per cent.—*Pharm. J. Lond.*, 1907, v. 24, p. 17.

Hallberg, C. S. N., asserts that when the pure food and drugs law went into effect it was found that there were hundreds of bales of ipecac in warehouses in New York which could not be sold because the drug contained 1.75 per cent of the active principle emetine while the pharmacopœia has fixed it at 2 per cent.—*Proc. Arkansas Pharm. Ass.*, 1907, p. 28.

Hankey, William T., points out that a few years since there was considerable trouble experienced in securing the official variety of ipecac since the cheaper variety was commonly substituted, especially when in the powdered form. Since both varieties are now admitted to the U. S. P. this trouble no longer exists. He also points out that there was considerable difficulty experienced in securing ipecac which would assay the required 2 per cent alkaloids, but since the new supplement to the U. S. P. VIII has reduced the standard to 1.75 per cent, a very much larger percentage of the

samples examined by him comply with the official requirements.—Proc. Pennsylvania Pharm. Ass., 1907, p. 70.

An editorial points out that a quantity of ipecac impounded by the Government for some time has been at last set free. The drug did not quite measure up to the standard of the U. S. P. test of 2 per cent of total alkaloids, so with the whole country talking about pure food and pure drugs, it is hardly to be wondered at that the appraisers were undecided about admitting a drug below the accepted standard.—Oil, Paint and Drug Reporter, N. Y., 1907, v. 71, Jan. 28, p. 7.

Vanderkleed, Charles E., reports 15 assays of ipecac ranging from 1.8 to 3 per cent. He asserts that the quality is very good and that there is no good reason for reducing standard from 2 to 1.75 per cent of alkaloids.—Proc. Pennsylvania Pharm. Ass., 1907, p. 89.

Gausby, R. A., asserts that ipecac frequently assayed considerably under the U. S. P. VIII requirements for alkaloids, but as the whole root is seldom or never demanded by the retailer, it being chiefly sold in the form of fluid extract and powder, the manufacturer is easily enabled to meet the official requirements by a proportionately increased amount of drug or the elimination of a portion of the inert central woody portion during the process of powdering.—*Ibid.*, 1907, p. 73.

Blome, Walter H., (com. on adulterations) reports that ipecac is frequently low under the former 2 per cent requirement.—Proc. Michigan Pharm., 1907, p. 69.

Hankey, W. T., asserts that 75 per cent of all samples are below the 2 per cent which was required by the U. S. P. 1.75 per cent is a fair average.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 326.

Gane, E. H., reports the examination of 10 lots of Rio varying from 1.7 per cent to 2.27 per cent; 10 lots of Carthagenia, from 2.1 per cent to 2.70 per cent; 1 lot of Jahore, 2.09 per cent.—*Ibid.*, v. 55, p. 326.

Patch, E. L., examined 9 lots varying from 1.45 per cent to 2.19 per cent.—*Ibid.*, v. 55, p. 326.

Caspari, Chas. E., (com. on adulterations) examined 3 samples; 2 satisfactory, 1 weak.—Proc. Missouri Pharm. Ass., 1907, p. 147.

Philipp Röder (Jahresbericht, Wien, 1907, p. 104) reports on 9 samples of ipecac. One sample contained 11.75 per cent of ash and the remaining 8 varied from 2.67 to 5.16 per cent. The alkaloid content of the accepted samples varied from 2.20 to 2.91 per cent.

Naylor, W. A. H., reviews the U. S. P. process for determining the alkaloid in fluid-extract of ipecac and points out some of its defects. He asserts that ether is not a very satisfactory solvent for shaking out ipecacuanha alkaloids, and believes that chloroform would be more satisfactory.—Am. Druggist, N. Y., 1907, v. 50, p. 356.

Roehr, Clarissa M., discusses the official process for the assay of fluid extract of ipecac, and points out that this preparation may be assayed successfully either by the official process given for the assay of belladonna, by Professor Gordin's process, or by Professor Lyons' process, but not by the present official method.—*Pacific Pharm.*, San Francisco, 1907, 1908, v. 1, pp. 352-354.

Naylor and Chappell discuss the U. S. P. process of assay for fluid-extract of ipecac, and compare the results obtained with the results obtained by the authors' standard processes when applied to the same sample of extract.—*Pharm. J. Lond.*, 1907, v. 24, p. 394.

Taylor, F., (*Brit. J. of Children's Dis.*, Lond., Sept.) states that it is his custom to give ipecacuanha in bronchopneumonia, though its mode of action seems doubtful; but he thinks that it modifies the bronchial secretion, and he believes it does more good in this way than by driving the already formed secretion out through the larynx.—*J. Am. M. Ass.*, 1907, v. 49, p. 1724.

Bloyer thinks that of all the remedies of the *materia medica* with which he has had experience, not one has given the full measure of satisfaction that has come from the use of ipecacuanha.—*Eclectic M. J.*, Cincin., 1907, v. 67, pp. 622-626.

Kinyon, C. B., points out that ipecac is indicated by "a continuous flow of bright red blood with cutting pain about the umbilicus; pressure in the uterus and rectum; hemorrhage following confinement or miscarriage; especially does this occur after the delivery of the placenta.—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 387.

Rosenberger, A. S., points out that when the bronchial symptoms prevail we need to look to such remedies as ipecac.—*Ibid.*, 1907, 63d session, p. 420.

Additional references on the use of ipecacuanha will be found in the *Index Medicus* and *J. Am. M. Ass.*

JALAPA.

Jackson, John R., describes and figures a growing plant of *Jalap*.—*Pharm. J. Lond.*, 1907, v. 25, p. 100.

Remington, Joseph P., reports that the U. S. P. standard for jalap root is now 7 per cent of total resin.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 135.

Troxell, H. L., (com. on adulterations) points out that although the United States Pharmacopœia has reduced the per cent of resin to 7, it is difficult to find root answering required strength. "Moore" examined 276 samples of root and found figures ranging from 15.5 per cent to 2.1 per cent, an average of 5.95 per cent. It is claimed frequently that the jalap root is deprived of its resin by washing with alcohol before shipping, but whether or not this assertion is true is not verified.—*Proc. Maryland Pharm.*, 1907, p. 86.

Dohme and Englehardt point out that although the requirement of the U. S. P. for jalap root has been cut down to 7 per cent resin, it is very difficult to find a root with the required amount. They call attention to the examination of 276 samples by Moore in which he found figures ranging from 15.63 to 2.1 per cent, with an average of 5.95 per cent. Only 26 of the samples assayed above 9 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 380.

Joyce, T. G., presents a note on recent samples of jalap and reports an examination of 13 samples. He points out that during the last two years he has had difficulty in obtaining samples that conform with the Pharmacopœia requirements, the highest percentage of total resin obtained being 11.46, while the majority of samples yielded amounts ranging between 6 and 8 per cent.—Chem. & Drug. Lond., 1907, v. 70, p. 488.

Blome, Walter H., (com. on adulterations) says that jalap was usually of better quality during the past year. Since the reduction to 7 per cent of total resin the drug usually complies with the pharmacopœial demands.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Hankey, W. T., examined 9 samples containing a resin content of from 6.42 to 13.36 per cent; ether soluble 0.92 to 2.35 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 326.

Gane, E. H., examined 10 lots varying from 8.83 per cent to 11.7 per cent total, and from 1.38 per cent to 2.01 per cent ether soluble.—*Ibid.*, v. 55, p. 326.

Patch, E. L., reports two lots examined which assayed 11.43 per cent and 13.00 per cent total resin; and 1.18, 1.38 per cent ether soluble.—*Ibid.*, v. 55, p. 326.

Philipp Röder (Jahresbericht, Wein, 1907, p. 105) reports on 5 samples of jalap which varied from 8.76 to 13.75 per cent of resin content, and from 3.75 to 4.49 per cent of ash.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 91) discuss the estimation of the resin content of jalap and point out that the Ph. Helv., Ph. Suec., and U. S. P. require 7 per cent, Ph. Germ. 9 per cent, and Ph. Japon. 10 per cent of resin.

Mossler, Gustav, examined 2 samples of jalap, which contained 4.12 and 3.81 per cent respectively of ash, and 9.8 per cent and 5.6 per cent of resin.—Ztschr. d. Allg. österr., Apoth.-Ver., Wien, 1907, v. 45, p. 55.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 27) found the amount of resin extracted from 14 lots to range from 7.5 to 11 per cent. The figures were obtained after drying and powdering large quantities of the drug, the loss of weight on drying amounting to from 3 to 14 per cent.

Déer points out that the several pharmacopœial descriptions of resin of jalap are either simple reproductions or at least based on

the Ph. Germ. (III and IV) monograph. He reviews the reputed properties of this substance and records his own experience on the solubility and the tests for identity and purity.—*Apoth. Ztg., Berl.*, 1907, v. 22, pp. 862–864.

Guignes, P. (*Bull. sc. pharmacol. Par.*), regards the ether solubility of jalap resin, generally accepted as criterion of identity, as being insufficient, and particularly so in cases of adulteration with such resins as colophonium, mastic, guaiac, sandarac, etc. In such cases he recommends the polarimetric method, which he describes.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 681.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 27) found the acid value of a batch of resin of their make to be 22.4. and its saponification value 179.2. Only 4.6 per cent was soluble in ether.

McDowell, Ralph W., recommends the use of compound powdered jalap or of a large dose of calomel, followed by a saline purge, in the treatment of delirium tremens. A number of drugs are discussed.—*N. York M. J.*, 1907, v. 86, p. 1025.

KAOLINUM.

Porter, J. T., (*U. S. Geol. Survey, Bull.* 315, 268–290) gives in detail the results of work done in the laboratory of Chas. Catlett, Staunton, Va. A long list of minerals likely to be found in fuller's earth is first given, and the opinion is expressed that fuller's earth results from the decomposition of hornblendes and augites rather than from feldspars.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 1684.

KINO.

Nelson, Burt E., discusses the nature and origin of kino, describes its powder and enumerates its constituents.—*Merck's Report*, N. Y., 1907, v. 16, p. 192.

Smith, H. G., (*Abstr. Proc. Roy. Soc. N. S. Wales*) discusses the eucalyptus kinos, their value for tinctures and the nongelatinization of the product of certain species and points out that there are three tannins at least in eucalyptus kinos and that all are determinable by reagents. The one which gives the violet coloration and precipitates with ferric chloride gelatinizes most readily. The one giving a green coloration with ferric chloride also gelatinizes, but not so rapidly as the others. The tannin which gives a blue coloration with ferric chloride does not gelatinize in tinctures.—*Pharm. Centralbl.*, 1907, v. 104, p. 271.

Caldwell, Paul, says that 1 ounce of compound tincture of kino contains 4½ grains of powdered opium and 52 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 205.

KRAMERIA.

Beringer, George M., discusses and presents a formula for a fluid-glycerate of krameria, a liquid extract having the same drug strength as the U. S. P. fluid extracts.—*Am. J. Pharm. Phila.*, 1907, v. 79, pp. 410-412. (See also *Proc. New Jersey Pharm. Ass.*, 1907, p. 56.)

LEPTANDRA.

Henkel, Alice, describes and figures *Veronica virginica* L., also named *Leptandra virginica* L., Nutt., commonly called Culver's root, Culver's physic, blackroot, bowman's root, Beaumont root, Brinton root, tall speedwell, tall veronica, physic root, and whorlywort.—*Bul. Bur. Plant Ind., U. S., Dept. Agric.*, 1907, No. 107, pp. 59-60.

LINIMENTA.

Hommell, P. E., thinks the U. S. P. liniments, with the exception of liniment of camphor, are good embrocations. But there should be added to the list a perfectly satisfactory compound liniment, one combining the properties of a desirable counterirritant, anodyne, antiseptic, and alterative, to replace the many proprietary liniments.—*Proc. New Jersey Pharm. Ass.*, 1907, p. 63.

LINIMENTUM AMMONIÆ.

Ramage, A. J., (*Pharm. Journ.*, March 9, 1907, 287) commenting on the ammonia liniment, as directed by the *Ph. Brit.*, says that if the solution of ammonia is added to the oils previously mixed, or first shaken with the olive oil and then the almond oil, a liniment of a buttery consistence results, which can with difficulty be poured; but if the almond oil and solution of ammonia be first mixed and the olive oil afterwards added, a much more fluid liniment is obtained.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 664.

LINIMENTUM CALCIS.

Sutcliffe, P. T., states that Carron oil is soothing for burns, and that the second dressing is not so painful as after most other drugs; beyond that, however, he thinks it has nothing to recommend it.—*Brit. M. J.*, 1907, v. 2, p. 523.

LINIMENTUM CAMPHORÆ.

Hill, Geo. H., suggests making liniment of camphor by circulatory displacement, a method which he points out is also applicable to other pharmaceutical preparations.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 263.

Harrison, E. F., (*Pharm. Journ.*, 1907, 79, 69) describes experiments to show that if lump camphor be used in place of flowers of camphor a much longer time is required for solution, and if heat be used to accelerate solution a serious loss of camphor may result. Thus, in one experiment small lumps were dissolved in three and one-half hours at 50° C., and the product contained 19.52 per cent of camphor. In a second experiment the beaker was kept in boiling water for three hours, and the product contained 18.85 per cent of camphor; whilst in a third case the camphor was dissolved in fifty-five minutes at 105° C., and the product contained only 16.16 per cent. By using freshly-sifted flowers of camphor the liniment can be prepared rapidly and without risk of loss.—*Analyst*, London, 1907, v. 32, p. 328.

Lythgoe, Hermann C., reports that of 19 samples of camphor examined, 14 were found to be adulterated. The percentage of camphor found in samples considered below strength varied from 0 to 13 per cent.—*Rep. Massachusetts Bd. Health*, 1907, 1908, p. 380.

Gilmour, J. P., reports 6 out of 86 samples not up to Ph. Brit. requirements; average deficiency 30 per cent. He considers it perhaps unfortunate that the Ph. Brit. gives no specific instructions as to the precise mode of preparation of the liniment, but adds that the most essential thing is to put in all the camphor.—*Year Book Pharm.*, Lond., 1907, pp. 446-455.

LINIMENTUM CHLOROFORMI.

The N. Y. State Board of Health, Eastern Branch, examined 246 samples of chloroform liniment; 42 deficient.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 324.

LINIMENTUM SAPONATO-CAMPHORATUM N. F.

Dunning, H. A. B., discusses the N. F. formula for solid opodeldoc and proposes a formula which he believes yields a much more satisfactory preparation.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 130.

Beringer, George M., points out that his preparation is not identical with the solid opodeldoc directed by the Ph. Germ.—*Proc. New Jersey Pharm. Ass.*, 1907, p. 74.

Kunze, F. R., (*Pharm. Ztg.*, lii, 1907, No. 102, 1059) recommends the following formula: 50 parts of stearin and 25 parts of pure sodium carbonate are saponified in a covered iron vessel; the soap is dissolved in 1,000 parts of alcohol by the aid of heat, 30 parts of camphor, 100 parts of alcohol added, and the warm solution filtered in a covered funnel into the stock-bottle. Then 5 parts of thyme, 10 parts of oil of rosemary, and 30 parts of spirit of ammonia are mixed with the filtrate and the mixture is rapidly cooled.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 92.

LINIMENTUM SAPONIS.

Thurston, Azor, points out that camphor and oil of rosemary are dextrogyrate and that the polariscope reading for soap liniment, in a 200 mm. tube at 25° C., should be about +9° V.—Merck's Report, N. Y., 1907, v. 16, p. 124.

The N. Y. State Board of Health, Eastern Branch, reports 91 samples examined, 3 deficient.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 330.

LINUM.

Ebert, Felix, points out that Chinese linseed is comparatively smaller than that grown in Europe or America, but otherwise identical with it. The use of the seed in China is also the same as with us.—Ztschr. d. Allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 502.

The inspectors of pharmacies found ground linseed contaminated with oil cake meal.—Ann. de pharm. Louvain, 1907, v. 13, p. 277.

Rusting, Gullow, (Ann. pharm. Louvain, Jan., 1907) conducted numerous examinations which failed to discover starch grains in flaxseed, though the cellular membrane of certain tissues of the seed gives a blue color with iodine. Ranwez also had his students make several hundred examinations, which gave a negative result. The starch frequently found in linseed meal must arise from an admixture of foreign seeds.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2929.

Schuroff, P., states that starch is found in quantity in the parenchymatous layer lying between the mucilaginous epidermis and the sclerenchyma. The grains are round oval shaped, quite uniform, the largest 0.04 millimeter in diameter; consequently some starch is always found in the meal.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 326-327.

Scoville, W. L., reports 12 barrels which ran from 24.45 per cent to 29.68 per cent oil. It has been rarely found to yield 30 per cent oil. It always has a pungent odor, indicating the presence of other substances.—*Ibid.*, v. 55, pp. 326-327.

Patch, E. L., reports 12 lots in 1906 found to contain from 35.5 per cent to 37 per cent oil. Eight barrels in 1907 about the same range.—*Ibid.*, v. 55, p. 327.

Gilmour, J. P., reports 5 out of 27 samples below Ph. Brit. standards; deficient in oil 33 per cent.—Year Book Pharm. Lond., 1907, pp. 446-455.

LIQUOR ALUMINI ACETATIS N. F.

Dulière, Walter, discusses the preparation of Burrow's solution and presents a formula which he asserts is to be included in the new French Codex. He points out that it is important to dissolve the aluminum sulphate in cold water to be sure of the absolute acid

content of the acetic acid and to follow the formula exactly.—*Ann. de pharm.*, Louvain, 1907, v. 13, pp. 99–102.

Sartorius, Albert, (*Apoth.-Ztg.*, xxii, 1907, No. 54, 568–570) after a comprehensive review of the numerous criticisms that have appeared from time to time concerning the preparation of solution of aluminum acetate, communicates experiments conducted by him, upon which he bases a rational process for the production of a stable preparation, which is described in the abstract.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 98.

Rothe, O., calls attention to the variable water content of aluminum sulphate and suggests that the specific gravity of the resulting solution would be a satisfactory indication of the content of salt, thus eliminating an important factor of uncertainty.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 671.

Frerichs, G., suggests the following method for determining the aluminum oxide content of solution of aluminum acetate: 10 gms. of the solution are diluted with 90 gms. of distilled water and heated. To the boiling solution about 5 gms. are added and the resulting precipitate separated by filtration is then calcined. The weight of the resulting material should be 0.23–0.26 gm.—*Apoth.-Ztg.*, Berl., 1907, v. 22, p. 212.

LIQUOR AMMONII ACETATIS.

Purcell, Francis J., states it as his belief that we have no better agent than the official liquor ammonii acetatis in hastening the elimination of alcohol, in the treatment of delirium tremens. The treatment of delirium tremens is discussed in this place by a number of contributors.—*N. York M. J.*, 1907, v. 86, p. 1028.

Prout, W. T., states that after the evacuation of the bowels by calomel in the treatment of blackwater fever, the best means of securing diaphoresis in the presence of an irritable stomach is a mixture of the solution of ammonium acetate and spirit of nitrous ether, to which may be added potassium acetate or nitrate.—*Brit. M. J.*, 1907, v. 2, p. 1326.

LIQUOR AMMONII CITRATIS FORTIOR N. F.

Beringer, George M., points out that the note under stronger solution of ammonium citrate N. F. is misleading and that a dilution 1 with 4 does not yield a product equivalent to the Ph. Brit. Solution of Ammonium Citrate.—*Am. J. Pharm. Phila.*, 1907, v. 79, p. 364.

LIQUOR ANTISEPTICUS.

Smith, Otis W., points out that liquor antisepticus is intended to compete with a number of nontoxic antiseptic solutions which have been very popular for years. While the official product is undoubtedly

as efficient as the commercial products, it differs from the best known in flavor, being somewhat stronger and harsher, and for this reason will probably not replace the manufactured article to any great degree.—*Proc. Missouri Pharm. Ass.*, 1907, p. 133.

Dawson, Edward S., is of the opinion that the U. S. P. antiseptic solution will not become popular with physicians until its flavor has been improved by the addition of small percentages of glycerin and of gaultheria.—*Proc. New York Pharm. Ass.*, 1907, p. 226.

Cliffe, W. L., points out that for the official antiseptic solutions it is necessary to use essential oils of high grade. He also suggests that the oils be dissolved in the alcohol and the resulting solutions allowed to stand for some time to blend. With solutions of this kind on hand the official antiseptic solution can readily be made extemporaneously.—*Am. J. Pharm. Phila.*, 1907, v. 79, p. 245.

Verhoeff and Ellis examined some of the widely advertised antiseptics for their bactericidal value and state that none of those mentioned in their list exceed the official liquor antisepticus in bactericidal power.—*J. Am. M. Ass.*, 1907, v. 48, pp. 2175–2176.

LIQUOR ANTISEPTICUS ALKALINUS N. F.

Benfield suggests that a much more uniform and brighter color can be obtained by macerating powdered cudbear with the aqueous alkaline solution; using 2 gm. of the powder to the liter of the finished product.—*Bull. Am. Pharm. Ass., Chicago*, 1907, v. 2, p. 121.

Ferrel, O. L., expresses the belief that the use of 4 cc. of eucalyptol and 15 cc. of tincture of cardamom compound would tend to change the composition of the alkaline antiseptic solution to such a degree that the sweet taste would disappear and the aromatic quality be markedly improved. He also thinks that magnesium carbonate is a more satisfactory clarifying agent for this preparation than talcum.—*Proc. Texas Pharm. Ass.*, 1907, p. 74.

Scoville, W. L., states that some have complained that Alkaline Antiseptic, N. F., is too sweet, and have cut down the glycerin to half that directed in the formula, to correct this trouble. It is not the glycerin, but the flavor that needs correcting. Keep the glycerin as it is in the formula, but use twice as much eucalyptol and add 15 cc. of compound tincture of cardamom, and the sweet effect will disappear while the aromatic quality will be improved. Magnesium carbonate is a better clarifying agent for this than purified talc.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 294.

LIQUOR CALCIS.

Raubenheimer, Otto, calls attention to the need for dispensing lime water that will comply with the requirements of the U. S. P. and describes his continuous and automatic apparatus for the preparation of lime water.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 179-183.

Gilmour, J. P., points out that most commercial samples of lime water give more than traces of chlorides, and asserts that it is significant that the U. S. P. omits any test for these. Although the presence of a fractional percentage of chlorides is not likely to be detrimental, he believes that the most satisfactory lime water is that prepared with calcium hydroxide, derived from marble.—*Pharm. J.*, Lond., 1907, v. 25, p. 110.

An answer to a correspondent calls attention to the need for care in connection with lime water and points out that calcium hydroxide will gradually change to calcium carbonate.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 727.

"Gnomon" points out that lime water which seems to cause untold trouble to many retailers is a solution which is so inexpensive and so easy to make that there does not appear to be the slightest necessity for anyone to keep it in stock for any prolonged period.—*Pharm. J.*, Lond., 1907, v. 24, p. 748.

The State Pharmaceutical Examining Board reports that of 300 samples examined 181 fell short of the standard of strength fixed by the U. S. P. Some of these samples were very inferior in character and two did not seem to be more than mere hydrant water.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 272.

Barnard, H. E., reports 57 samples of lime water examined; 38 or a total of 56.7 per cent were below standard.—*Rep. Indiana Bd. Health*, 1907, pp. 186-187.

Fischer, Richard, found that only 45 per cent of all of the samples of lime water examined complied with the requirements of the Pharmacopœia. A very large number contained little or no lime at all.—*Proc. Wisconsin Pharm. Ass.*, 1907, p. 34.

Ladd, E. F., reports finding a sample of lime water which contained but 0.08872 per cent of calcium hydrate, or about 50 per cent of the U. S. P. strength.—*Rep. North Dakota Agric. Exper. Sta.*, 1907, Part II, p. 144.

LIQUOR CRESOLIS COMPOSITUS.

Klenze, W. T., asserts that the faults most generally found with the compound solution of cresol are that it does not produce a clear mixture with water and that it varies too much in color. He finds that as ordinarily made it contains unsaponified linseed oil which, of course, would cause a turbid mixture with water. He also suggests

heating the mixture of oil and potash to complete saponification.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 379.

According to a Prussian ministerial ordinance (Oct. 19, 1907) the saponated cresol solution of the Ph. Germ. IV is to be replaced by the solution prepared according to the improved formula proposed for the new edition of the Ph. Germ. now in course of revision. While in the proposed formula the percentage of cresol is the same as in the present one, the cresol is defined as having the boiling point 190°–204°, instead of as “cresol. crud.,” and the quantity of actual soap is increased, this being effected by reducing the quantity of water for the saponification of 60 parts of linseed oil so as to make 100 parts of soap instead of 135 parts, and adding 100 parts of cresol instead of 135 parts (Pharm.-Ztg., lii, 1907, No. 90, 937).—Proc. Am. Pharm. Ass., 1908, v. 56, p. 100.

Eger, E., (Pharm.-Ztg., lii, 1907, No. 90, 937) discussing the changes in the proposed modification of the Ph. Germ. formula for liq. cresol. saponat., considers the new preparation to be fully the equal both to lysol and the present preparation in its disinfectant properties, owing to the specification of cresol having a definite composition.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 101.

Woolcock, W. J. Uglow, discusses the Ph. Germ. and the U. S. P. formulas for cresol soap solutions and presents a formula containing 6 per cent of added glycerin, which he considers to be an advantage.—Pharm. J. Lond., 1907, v. 25, p. 334.

McBryde, C. N., (Bureau of Animal Industry, U. S. Department of Agriculture, 1907, Bulletin No. 100) reports an examination of liquor cresolis compositus of the U. S. P., the germicidal efficiency of which, when made with cresol boiling between 187° and 189° C., he found to be nearly one and a half times greater than carbolic acid. He concludes that as a solution made with the least effective cresol has a higher disinfectant value than carbolic acid it is safe to conclude that a preparation derived from any cresol answering the U. S. P. requirements and boiling between 195° and 205° C. would surpass carbolic acid in efficiency as a disinfectant.—Pharm. J. Lond., 1907, v. 25, p. 339.

Quant, Ernest, reports on the germicidal value of cresol-soap solutions and finds that a 1 in 400 dilution of cresol-soap solution compares in germicidal power with a 1 in 100 of carbolic acid.—*Ibid.*, v. 25, p. 778.

Tennant, C. E., reports the successful use of compound cresol solution for a bromine burn after trying picric acid and discarding it because of intense pain. Later he employed the compound cresol solution with entire satisfaction in a great variety of burns.—J. Am. M. Ass., 1907, v. 49, p. 1692.

Matter, O., (Beitr. Chem. Physiol. (Hofmeister), 10, 251-252), reports a case of lysol poisoning. The urine was dark colored, just as after carbolic poisoning.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 3021.

Friedländer, Richard, discusses the toxicology of lysol, its frequent use in Germany as a poison, and points out that the most efficient treatment in such cases is the washing out of the stomach, the administration of oil or albumin, and the use of tonics when indicated.—Therap. Monatsh., Berl., 1907, v. 21, pp. 274-275.

An editorial note points out that in recent times over 100 cases of lysol poisoning have taken place each year in Berlin. The poisoning has awakened considerable interest, partly because the toxicology opens up the study of a whole group of substances which are chemically related to carbolic acid.—Therap. Gaz., Detroit, 1907, v. 31, p. 353.

LIQUOR FERRI ALBUMINATI N. F.

Beringer, George M., points out that excellent formulas for the solutions of organic salts of iron were long ago published in Dietrich's Manual, and that the liquor ferri albuminati is official in the Ph. Germ.—Am. J. Pharm., Phila., 1907, v. 79, p. 364.

Scoville, W. L., states that the preparation of solution of iron albuminate, N. F., requires careful work, particularly in neutralizing the mixture of egg albumin and solution of ferric oxychloride. The addition of the alkali must be made very cautiously, and an excess carefully avoided to obtain a precipitate that can later be redissolved. The same principles apply to the solution of iron peptonate.—Drug. Circ., N. Y., 1907, v. 51, p. 294.

Dunning, H. A. B., (Drugg. Circ., May, 1907, 374) referring to the observations recently made by Scoville concerning the proper manipulation in making solution of iron albuminate by the "N. F." formula, mentions his own experience with this preparation, which coincides with the observations of Scoville. He suggests some precautions which, if followed, he thinks will do away with the difficulty in making this preparation.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 670.

LIQUOR FERRI ET AMMONII ACETATIS.

Tyson, J. (Penn. Med. J., Athens, Nov.), states that Basham's mixture is used too carelessly, and that he uses much less than formerly. Iron in small doses, with very small doses of mercuric chloride, freely diluted, is recommended.—J. Am. M. Ass., 1907, v. 50, p. 155.

LIQUOR FERRI CHLORIDI.

Lyons, A. B., believes that for the solution of chloride of iron too large a range of specific gravity is allowed.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 64.

Bachman, Gustav, (com on adulterations) reports solution of ferric chloride ranging from 10.2 per cent to 9.6 per cent of metallic iron instead of 10 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Troxell, H. L. (com. on adulterations), states that occasionally samples occur with undue amount of nitric acid or iron oxychloride. Proc. Maryland Pharm., Ass., 1907, p. 86.

Bachman, Gustav, (com on adulterations), reports tincture of ferric chloride ranging from 4.3 per cent to 3.8 per cent of metallic iron, instead of 4.58 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Barnard, H. E., reports that of the 68 samples of tincture of iron analyzed, 35 were pure and 33 adulterated. This is equivalent to 48.5 per cent, a decided improvement over the results obtained last year.—Rep. Indiana Bd. Health, 1907, p. 196.

La Place, Ernest, calls attention to the value of tincture of ferric chloride in the constitutional treatment of erysipelas.—J. Am. M. Ass., 1907, v. 49, p. 236.

Solis-Cohen, S., states that the tincture of ferric chloride is the best remedy at our command for the treatment of anemia associated with rheumatism. He gives a formula for preparing a "mistura ferro-salicylata" whereby the precipitation of ferric salicylate is avoided.—*Ibid.*, v. 49, pp. 2049–2053.

LIQUOR FERRI OXYCHLORIDI N. F.

Scoville, W. L., states that too much exposure of the precipitate first formed will spoil the solution of ferric oxychloride, N. F. It is important that the ammonia water shall be of full strength (overstrength will do no harm) and that the full amount of diluting water be used. Then the iron solution must be added to the ammonia solution, and not vice versa. The washings of the magma should be as rapid as possible (usually two decantations per day, at morning and at night) and the water used should be as free as possible from dissolved air or gases. Finally squeeze all the water possible from the precipitate and thoroughly mix the hydrochloric acid with it. Too much or too strong an acid will make a lighter colored preparation, not as useful for the particular purposes of this solution.—Drug. Circ., N. Y., 1907, v. 51, p. 294.

Owen, R. Cecil, discusses the chemistry and physics of dialyzed iron and concludes that the whole question of colloidal solutions is still shrouded in mystery, in spite of the patient and painstaking labor of many brilliant investigators.—Pharm. J. Lond., 1907, v. 25, pp. 432–433. (See also *ibid.*, v. 25, pp. 435–436.)

LIQUOR FERRI PEPTONATI CUM MANGANO N. F.

Beringer, George M., thinks Dietrich's formulas for solution of iron manganese peptonate preferable for this and similar preparations.—Proc. New Jersey Pharm. Ass., 1907, p. 74.

Wilbert, M. I., points out that the N. F. formula for solution of peptonate of iron with manganese is unpractical and regrets that the committee did not include the widely used formula by Dietrich or the very simple formula proposed by Dunning (Proc. A. Ph., A., 1905, p. 397).—Am. J. Pharm. Phila., 1907, v. 79, p. 211.

Dunning, H. A. B., believes the N. F. formula for solution of peptonate of iron with manganese is a very poor one and yields an objectionable preparation.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 131.

He presents a formula and directions for making solution of iron and manganese peptonate, using fresh egg albumin, iron chloride, and manganese citrate.—Bull. Pharm., 1907, v. 21, p. 121. (See also p. 211 for corrections.)

Harrison recommends that a definite percentage of iron and manganese citrate be required in the preparation. He also asserts that manganese citrate is not readily obtained and when obtained varies in composition.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 380.

Hemm, Francis, discusses soluble manganese citrate and points out that many samples do not dissolve while others have a tendency to precipitate, and that unless we can be assured of getting a perfectly soluble and permanently soluble manganese citrate it would be advisable to employ in this formula the peptonized manganese in preference, as this is quite soluble and easily obtainable.—Proc. Missouri Pharm. Ass., 1907, pp. 104-105.

LIQUOR FERRI SUBSULPHATIS.

Bachman, Gustav, (com. on adulterations) reports solution of subsulphate of iron ranging from 12.57 to 11.2 per cent of metallic iron, instead of 13.57 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

LIQUOR FERRI TERSULPHATIS.

Lyons, A. B., points out that for a solution of definite strength, solution of tersulphate of iron is permitted to have too large range of specific gravity.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 64.

Bachman, Gustav, (com. on adulterations) reports solution of tersulphate of iron ranging from 9.8 per cent to 8.56 per cent of metallic iron, instead of 10 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

LIQUOR FORMALDEHYDI.

de Waal, J. W., (*Pharm. Weekbl.*, 1907, No. 40) concludes from his experiments that solution of formaldehyde at ordinary room temperature and protected from light and atmospheric air is not readily oxidized to formic acid.—*Jahresb. d. Pharm. Göttingen*, 1907, v. 42, p. 191.

Smith, Otis W., points out that while commercial solution of formaldehyde is labeled 40 per cent one can seldom obtain it of this percentage of concentration except in cool weather. This solution readily parts with a portion of the active body when the temperature rises or through agitation.—*Proc. Missouri Pharm. Ass.*, 1907, p. 133.

Reychler, A., contributes a study on the chemical properties of formaldehyde.—*Bull. de la Soc. Chim. de France*, Paris, 1907, v. 1, 4th series, pp. 1189–1195.

Doby, G., presents some observations on the valuation of commercial formaldehyde solution.—*Ztschr. f. ang. Chem.*, Berl., 1907, v. 20, pp. 353–356.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 22) examined 9 samples of commercial formaldehyde solution, assayed by oxidation, which gave from 1.083 to 1.088 specific gravity and from 35.4 per cent to 37 per cent formaldehyde by weight.

Bachman, Gustav, (com. on adulterations) reports solution of formaldehyde ranging from 36.6 per cent to 31.8 per cent, instead of 37 per cent as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 41.

Feder, E., describes mercuric chloride solution which he recommends as a reagent for aldehydes, particularly formaldehyde.—*Arch. d. Pharm.*, 1907, v. 245, pp. 25–28.

Ditz, Hugo, discusses the reactions of formaldehyde that take place in the presence of concentrated sulphuric acid, particularly its behavior with naphthalin, phenanthren, anthracen, reten, chrysen. and carbazol.—*Chem. Ztg. Cöthen*, 1907, v. 31, pp. 445–446, 486–487.

Gabutti, Emilio, (*Boll. Chim. Farm.*, 1907, 349–351) outlines a new reaction for the detection of formaldehyde which depends on the change of color produced in a sulphuric acid solution of carbazol.—*Pharm. J. Lond.*, 1907, v. 25, p. 185.

Richardson, F. W., discusses the determination of formaldehyde in milk and gives as his opinion that the best methods hitherto devised is that by Hehner (“*Analyst*,” 1896, 94 et seq.).—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, pp. 3–4.

Fenton, H., (*Proc. Chem. Soc.*, 23, 1907, 83–84) regards the following three methods for the detection of formaldehyde to be the most pronounced: 1. With phenylhydrazine chlorhydrate, sodium nitro-

prusside, and sodium hydroxide solution, a transient blue color. 2. With alcoholic solution of gallic acid and concentrated sulphuric acid, development of a blue zone. 3. With resorcin solution and concentrated sulphuric acid, development of a red or red-violet zone.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 353.

Auerback and Barschall present a study on formaldehyde in which they discuss the solid polymers of this compound, their production and properties.—*Arb. a. d. k. Gsndhtsamte, Berl.*, 1907, v. 27, pp. 183–230.

Breslauer and Pictet (*Ber. d. d. chem. Ges.*, 1907, p. 3784) report on some condensation products of formaldehyde.—*Apoth. Ztg., Berl.*, 1907, v. 22, p. 997.

Robin, Lucien, makes some observations on the estimation of formic aldehyde in solution, and its polymers.—*J. de pharm. et de chim. Par.*, 1907, v. 26, pp. 400–402.

Fleig, M. G., presents a comprehensive study of the physiological properties of various formic compounds, including formic acid, formiates, and formic aldehyde.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, pp. 147–230.

Anderson, John F., reports a study of the antiseptic and germicidal properties of solutions of formaldehyde and their actions upon toxines, and points out that formaldehyde not alone destroys bacteria, but their soluble products as well.—*Bull. Hyg. Lab. U. S. P. H. & M.-H. S.*, July, 1907, No. 39, p. 48.

An abstract from the *Practitioner* outlines a method of formaldehyde disinfection by means of potassium permanganate.—*Pharm. J. Lond.*, 1907, v. 25, p. 607.

Duerr and Raubitscheck (*Centr. Bakt. Parasitenk.*, 45, 77–81) conclude that with certain modifications of their own, the permanganate method of Evans and Harris is equal to the best practical methods of disinfection.—*Chem. Abstr. Am. Chem. Soc.*, 1908, v. 2, p. 283.

Houghton and Clark describe a method of formic aldehyde disinfection by means of potassium permanganate.—*Therap. Gaz. Detroit*, 1907, v. 31, pp. 459–461.

The contributor of an unsigned article in the "Miscellany" column states that the use of solid formaldehyde generators led to experiments to determine their efficiency as disinfectants. The results are reported in the *Monthly Bulletin* of the California State Board of Health for July, 1907. It appears to be efficient for surface disinfection when two ounces are used for 1,000 cubic feet, but not dependable for penetration. The fire risk is not to be disregarded. The report states that the permanganate method is preferable.—*J. Am. M. Ass.*, 1907, v. 49, p. 1205.

Rosenau, M. J., calls attention to the care with which the work of McClintic was performed in the investigation of formaldehyde

disinfection. He reasserts that the experiments demonstrate that considerable amounts of dry formaldehyde gas are insufficient to kill bacteria unless the proper conditions of temperature and moisture are present. The gas can not be depended on when the temperature is below 60° F. and the relative humidity of the atmosphere below 65 per cent to kill nonspore-bearing organisms.—N. York M. J., 1907, v. 85, p. 25.

Huber and Bickel (Münch. Med. Wochenschr., 1907, p. 1800) recommend the use of freshly calcined lime, formaldehyde solution, and boiling water for disinfection. They claim that but a small fraction of the formaldehyde is lost by combining with the lime, and that the technique affords a simple, cheap, and harmless substitute for the more efficient spray technique when the latter is not available or is otherwise objectionable.—Am. J. Pharm. Phila., 1907, v. 79, p. 577.

Schnürer, J., (Ztschr. Infektionskrank. u. Hyg. Haustiere, 2, 1906, No. 1, pp. 43–57) states that it is often possible to get a better penetration with fluid than with gaseous formalin, especially in stables in which there are cracks in the floor and other parts. He tested the value of formalin in an aqueous 1 per cent solution. The disinfectant results were entirely satisfactory.—Exp. Sta. Rec., 1906–7, v. 18, p. 987.

Kolle, W., (Deutsche med. Wchnschr., v. 33, No. 39) states that disinfection with formaldehyde spray is cumbersome and exposes to danger from fire (sic.). He describes a method of generating formaldehyde gas and steam.—J. Am. M. Ass., 1907, v. 49, p. 1564.

La Wall, Chas. H., points out the possible danger of fire from formaldehyde disinfection, using potassium permanganate to liberate the formic aldehyde.—Drug. Circ., N. Y., 1907, v. 51, p. 469.

Albert, Henry, discusses disinfection and disinfectants. He states that the room temperature must be above 68° F. when formaldehyde is used as disinfectant, as the gas is converted into a solid at that temperature.—J. Am. M. Ass., 1907, v. 48, pp. 402–405.

Wilcox, E. V. (N. York M. J., N. Y., Mch. 23), reports that ammonia sprinkled over the rugs of a room previously disinfected with formaldehyde and ventilated serves to remove the fumes of the formaldehyde completely.—J. Am. M. Ass., 1907, v. 48, p. 1214.

Additional references on the uses of formaldehyde solution will be found in the Index Medicus and the J. Am. M. Ass.

LIQUOR MAGNESII CITRATIS.

Raubenheimer, Otto, outlines a method of making solution of magnesium citrate and points out some precautions to be observed in making this preparation.—Proc. New York Pharm. Ass., 1907, pp. 243–246.

McClure, C. M., has investigated the relation between impurities in magnesium carbonate and the difficulty in filtering and keeping stock solution of magnesium citrate. He concludes that silica is a disturbing factor and is present in many samples of commercial magnesium carbonate.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 365.

The N. Y. State Board of Health, Eastern Branch, reports 176 samples examined, 34 deficient.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 327.

LIQUOR PHOSPHATUM ACIDUS, N. F.

Vanderkleed and Bernegau discuss the solution of acid phosphates, N. F., report on the examination of commercial samples of this preparation, and point out that even with the use of bone ash of the highest obtainable quality, a large excess over and above that specified in the N. F. formula must be used in order to obtain a preparation that does not contain an objectionable amount of free sulphuric acid.—*Proc. Pennsylvania Pharm. Ass.*, 1907, pp. 107-110.

Schulze, Louis, finds it difficult to secure bone ash for making acid solution of phosphates, N. F., and asserts that jobbers invariably sent animal charcoal when bone ash was ordered.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 179.

Vanderkleed, Charles E., reports that commercial solutions of acid phosphate were found so adulterated as to cause customers at soda fountains to be made sick. A test is included.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 82.

LIQUOR PLUMBI SUBACETATIS.

Bachman, Gustav, (com. on adulterations) reports solution of lead subacetate ranging from 19.5 to 18.26 per cent. He says that these samples had been standing for a long time, which perhaps accounts for the low percentage of lead subacetate.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 41.

Caldwell, Paul, says that 1 ounce of lotion of lead and opium, N. F., contains $1\frac{1}{2}$ grains of powdered opium.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 205.

LIQUOR POTASSII ARSEINITIS.

Greenish, Henry G., points out that the international agreement requires 1 per cent of arsenious oxide. All the pharmacopœias agree.—*Pharm. J.*, Lond., 1907, v. 24, p. 832.

Cook, E. Fullerton, reports some observations on the reasons for the great variety of colors obtained in the making of solution of potassium arsenite, and calls attention to the need for adhering strictly to the directions of the Pharmacopœia.—*Proc. Pennsylvania Pharm. Ass.*, 1907, pp. 231-233.

Astruc and Cambe present a modified formula for the preparation of Fowler's solution, where the latter is prescribed in mixtures with certain tinctures which it precipitates, such as those of *nux vomica*, *calumba*, *cinchona*, etc.—*Répert. de pharm. Par.*, 1907, v. 19, p. 109.

Stoepel, Paul, recommends that the addition of an aromatic to solution of potassium arsenite be discontinued in the *Ph. Germ.*, and calls attention to the fact that many of the foreign pharmacopœias have adopted this simplified solution.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 1063 (for discussion see *ibid.*, 1119, 1129).

Schindelmeiser, J., (*Apoth. Ztg.*, 21, 902) reports solutions of potassium arsenite of varying strength made with potassium carbonate and bicarbonate which kept practically unchanged for six and eight months respectively. Solutions of the same strength made with sodium carbonate and bicarbonate decomposed very rapidly.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 219.

Bachman, Gustav, (com. on adulterations) reports solution of potassium arsenite ranging from 0.82 per cent to 0.65 per cent instead of 1 per cent as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 41.

Bernegau, L. Henry, calls attention to the necessity of using the right formula in assaying dry potassium arsenite. The U. S. P. (p. 590) gives the formula for potassium arsenite as KAsO_2 , which is correct if we make a solution of the salt by gently heating As_2O_3 with an excess of potassium bicarbonate in the presence of water, as in the case of the official liq. potass. arsen., but it is not correct for the dry salt, which has the formula $\text{KAsO}_2 + \text{HAsO}_2 + \text{H}_2\text{O}$.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 555.

Tyson, James, states that there can be no doubt of the value of arsenic in the treatment of diabetes, though it is not so useful as opium, and it is useful mainly in mild cases. He prefers the Fowler's solution, in small doses, long continued without interruption.—*J. Am. M. Ass.*, 1907, v. 49, p. 1583.

Vanderhoof, Douglas, states that the anemia following malaria is best treated by some form of arsenic, Fowler's solution being preferred by himself.—*Ibid.*, v. 48, p. 1337.

LIQUOR POTASSII HYDROXIDI.

The Vienna correspondent calls attention to the frequency of poisoning, particularly of children, by solution of potassa, and states that the accident is usually due to the custom of permitting children to drink from bottles, and of keeping this poison in old beer bottles.—*Lancet*, Lond., 1907, v. 173, p. 868.

LIQUOR SODÆ CHLORINATÆ.

Kunze, Klut, and Radant discuss the breaking of stock bottles containing solution of chlorinated soda and suggest that it is probably due to the decomposing influences of metallic oxides on solutions of chlorinated soda.—Pharm. Ztg. Berl., 1907, v. 52, p. 972.

Sauer, Max, reports that in his experience amber glass stoppered bottles were unsuitable as containers for solution of chlorinated soda. Green glass bottles appear to be more satisfactory.—*Ibid.*, v. 52, p. 954.

Gilmour, J. P., found but two samples out of ten examined that complied with the Ph. Brit. requirement for solution of chlorinated soda.—Pharm. J. Lond., 1907, v. 25, p. 109.

Basu, Anakul Chandra, (Indian Med. Gaz., Calcutta, April), states that the solution of chlorinated soda is an excellent dressing for all forms of unhealthy and sloughing ulcers. The solution is used in a strength of 1 to 20.—J. Am. M. Ass., 1907, v. 48, p. 1990.

LIQUOR SODII PHOSPHATIS.

Klenze, W. T., points out that the principal trouble with compound solution of sodium phosphate is the inability to get the ingredients all into solution and to prevent subsequent precipitation. The suggestion is made to put all of the ingredients into a bottle in a fairly warm place over night.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 380.

LITHII CITRAS.

Blome, Walter H., (com. on adulterations) reports on samples of lithium citrate containing iron, aluminum, and alkalies in excess.—Proc. Michigan Pharm. Ass., 1907, p. 69.

LITHII SALICYLAS.

Caspari, Chas. E., (com. on adulterations) examined 5 samples, 4 satisfactory; 1 contained metallic impurities.—Proc. Missouri Pharm. Ass., 1907, p. 144.

LOBELIA.

Holm, Theo., describes and figures *Lobelia inflata*, L.; also presents descriptions and drawings on the microscopical structure of various portions of the plant.—Merck's Report, N. Y., 1907, v. 16, pp. 341-343.

Patch, E. L., examined four samples: 0.6, 0.4, 0.6, 0.58 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 327.

Chase, A. L., (J. Therap. & Diet.) concludes a paper on lobelia with the statement that there is not another medicine he carries in his

medicine case which he should feel more lost without than his bottle that contains the tincture of lobelia seed. He thinks it good "externally, internally, and eternally."—*Eclectic M. J.*, Cincin., 1907, v. 67, pp. 495-496.

LUPULINUM.

Nelson, Burt E., describes and figures the structural characteristics of lupulin and enumerates its several constituents.—*Merck's Report*, N. Y., 1907, v. 16, p. 163.

Graham, Willard, reports on three samples of lupulin which upon a microscopical examination, were found to contain varying amounts of mechanical impurities. All three samples were abnormal in ash content, while sample number three was abnormal in ether soluble matter.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 237.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 32) found two consignments, tested for mineral matter to yield 15.6 and 9.8 per cent of ash.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 76) reports that of 8 samples of lupulin examined only 2 complied with the 10 per cent limitation for ash; the remaining 6 varying from 11.68 to 21.41 per cent.

van der Harst, J. C., found samples of lupulin containing 24 and 12.5 per cent of ash and 52 and 65 per cent of ether soluble matter, respectively.—*Pharm. Weekbl.*, 1907, v. 44, p. 1506.

LYCOPODIUM.

Wigglesworth, Grace, discusses, describes, and figures the development and the structural characteristics of the young sporophytes of *Lycopodium clavatum* and of *L. complanatum*.—*Ann. Bot. Lond.*, 1907, v. 21, pp. 212-234.

Nelson, Burt E., describes and figures the microscopical appearance of lycopodium and enumerates some of its distinguishing properties.—*Merck's Report*, N. Y., 1907, v. 16, p. 163.

Caesar and Loretz (*Geschäfts*, Ber., 1907, p. 95) outline a method for determining the ash content of lycopodium and point out that the Ph. Austr. permits only 3 per cent, while the other leading pharmacopœias permit the the presence of 5 per cent of ash.

Blome, Walter H., (com. on adulterations) reports that all samples of lycopodium examined were pure.—*Proc. Michigan Pharm. Ass.*, 1907, p. 69.

Mossler, Gustav, examined 4 samples of lycopodium all of which were found to contain foreign constituents—starch and pine pollen, when examined with the microscope. These contaminations were slight, however, and were evidently accidental, not adulterations. The ash content of the various several samples varied from 1.39 per

cent to 2.5 per cent.—*Ztschr. d. allg. österr. Apoth.-Ver.*, Wien, 1907, v. 45, p. 37.

Patch, E. L., examined 6 samples varying in ash content from 1.4 per cent to 3 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 327.

Seeley, C. W., thinks this drug has certain virtues and should be further investigated; he gives some of the indications for its therapeutic use.—*Eclectic M. J.*, Cincin., 1907, v. 67, p. 245.

Adams, E. O., recommends lycopodium as a remedy for so-called lithiasis, with the well-known associated symptoms of tympanitis, constipation, and peculiar appetite.—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 369.

Kinyon, C. B., points out that lycopodium is useful in suppression of the menses with accompanying sadness and melancholy. With feeling of distension in the abdomen. Menses suddenly suppressed from fright. Pains from right to left. Severe bearing down as though the menses would recur. Always worse from 4 to 8.—*Ibid.*, 1907, 63d session, p. 388.

MAGMA MAGNESIÆ N. F.

Raubenheimer, Otto, discusses the making of magma magnesiæ, and presents a formula and method of procedure which he asserts can be readily followed and yields a satisfactory product.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 150-152.

Dunning, H. A. B., points out that magma magnesiæ is a rather tedious preparation to make, and somewhat too costly. He also believes that the N. F. requires an excess of magnesium sulphate.—*Ibid.*, v. 55, p. 131.

MAGNESII CARBONAS.

Mitchell, Edward, points out that jobbers formerly had difficulty in supplying U. S. P. magnesium carbonate, a trace of iron not being permissible. The trace remains, but the U. S. P. is more lenient now.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 307.

Gane, E. H., states that most of the medicinal product will not respond even to the modified U. S. P. tests, although testing up to the standard so far as per cent of oxide or carbonate is concerned. The difficulty seems to be in eliminating the last trace of soluble alkaline salts without largely increasing the cost of the official product. Some dealers are sending out these articles marked "for technical purposes only."—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 327.

Scoville, W. L., gives the following results of his examinations: 1 gm. 0.462 residue, 91.19 per cent of MgO. (U. S. P. standard 96 per cent.) 1 gm. gave 0.442 residue, 91.54 per cent MgO. 1 gm. 0.42 residue, 91 per cent MgO; 1 gm. 0.423 residue, 93 per cent MgO.—*Ibid.*, v. 55, p. 327.

Blome, Walter H., (com. on adulterations) reports examining samples of heavy magnesium carbonate which contained iron and calcium in excess; also reports on 2 samples of light magnesium carbonate: One contained 93 per cent and one 85.6 per cent of magnesium oxide.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Caspari, Chas. E., (com. on adulterations) examined 7 samples, 1 satisfactory; 6 contained excess of iron.—Proc. Missouri Pharm. Ass., 1907, p. 146.

McClure, C. M., gives the results of the chemical analysis of magnesium carbonate. Five of the 6 samples examined contained small quantities of silica.—Am. J. Pharm., Phila., 1907, v. 79, p. 365.

Philipp Röder (Jahresbericht, Wien, 1907, p. 89) reports that 2 of 8 samples of magnesium carbonate were rejected because of their incomplete solubility in acetic acid and 3 additional samples were rejected because of water soluble material.

MAGNESII OXIDUM PONDEROSUM.

Scoville, W. L., reports magnesium oxide varying from 92.5 per cent to 93.89 per cent. U. S. P. standard 96 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 327.

Philipp Röder (Jahresbericht, Wien, 1907, p. 90) reports that of 5 samples of magnesium oxide examined only 2 complied with the pharmacopœial requirements. Three samples rejected contained an excess of carbon dioxide and iron and were not sufficiently soluble in dilute acid.

The inspectors of pharmacies assert that magnesium oxide frequently contains carbonate; they have also found small quantities of iron, aluminum, calcium, and silicon.—Ann. de pharm., Louvain, 1907, v. 13, p. 328.

Milard, C. K., points out that of 28 samples of magnesia purchased, 9 were calcined magnesia, 11 magnesium carbonate, and 8 effervescing citrate of magnesia.—Chem. & Drug., Lond., 1907, v. 71, p. 792.

MAGNESII SULPHAS.

Rosenthaler, L., discusses the titrimetric estimation of magnesium salts by means of arsenic acid.—Ztschr. f. anal. Chem., Wiesb., 1907, v. 46, pp. 714–716.

Goldammer, A., discusses the production and the properties of dried magnesium sulphate.—Pharm. Zentralh., 1907, v. 48, pp. 395–397.

Caspari, Chas. E., (com. on adulterations) examined 7 samples of magnesium sulphate: 5 satisfactory; 2 contained arsenic.—Proc. Missouri Pharm. Ass., 1907, p. 146.

Scoville, W. L., states that it is impossible to get it free from dirt; otherwise almost C. P.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 327.

Loew, O., (*Science* II, 26: 512, 180, 1907) discusses the effects of magnesium sulphate on plants.—*Bull. Torey Bot. Club, Chicago*, 1907, v. 34, p. 219.

Tucker, Henry, discusses the local use of magnesium sulphate solutions in inflammation, and reports a number of cases in which the application has given satisfactory results.—*Therap. Gaz., Detroit*, 1907, v. 31, pp. 238–240.

Waterhouse, E. R., discusses the uses of magnesium sulphate, both internally and externally.—*Eclectic M. J., Cincin.*, 1907, v. 67, pp. 163–168.

Bancroft, Frank W., discusses the relative efficiency of the various methods for administering saline purgatives, and asserts that the results obtained by MacCallum have been confirmed in every respect.—*Journ. Biol. Chem., N. Y.*, 1907, v. 3, pp. 191–211.

Matthews and Jackson discuss the action of magnesium sulphate upon the heart, and the antagonistic action of some other drugs. They report a number of experiments, and in the summary of their conclusions point out that the action of magnesium sulphate upon the heart is practically the same throughout the mammalian, avian, reptilian, and amphibian classes.—*Am. J. Physiol., Bost.*, v. 19, pp. 5–13.

Meltzer and Lucas state that when magnesium salts are injected subcutaneously they are eliminated by the kidneys, and when the kidneys of rabbits are removed the toxic action of the magnesium salts is increased by 50 per cent, and in nephrectomized animals these salts have a cumulative effect.—*Jour. Expr. M., N. Y.*, 1907, v. 9, pp. 298–311.

Meltzer, S. J., is reported to have said that while the salts of magnesium were taken by the mouth with impunity, if they were injected subcutaneously they induced delirium, anesthesia and relaxation, and paralysis of the respiration. These salts are eliminated by the urine, and when the animal is deprived of the kidneys the oral administration of the magnesium salts proves fatal.—*N. York M. J.*, 1907, v. 85, p. 1004.

Bardier, E., concludes, with Jolyet and Cahours, Binet, Wiki, that the salts of magnesia act on the peripheral motor nerve system after the manner of curare. The modifications of the ergographic curve give the measure of this intoxication which progresses to complete paralysis of the terminal motor plaques.—*J. de physiol. et de path. gén. Par.*, 1907, v. 9, pp. 611–619.

Greeley, Horace, reports the successful treatment of two cases of tetanus with magnesium sulphate by hypodermoclysis.—*J. Am. M. Ass.*, 1907, v. 49, p. 940.

Robinson, G. Canby, reports a case of tetanus successfully treated with intraspinal injections of magnesium sulphate. He states that

these did not cause purging, but, on the contrary, there was severe constipation.—*Ibid.*, v. 49 pp. 493-496.

Henry, J. Norman, is reported to have said that the use of magnesium sulphate by intraspinal injection in tetanus was followed by death in 3 of the 4 cases, but the convulsions were relieved and the patients were able to sleep in all cases. Alarming respiratory depression was seen in several instances, and evidences of a cumulative action were also observed.—*Ibid.*, v. 49, p. 2032.

MALTUM.

Ball, A. W., discusses the preparation of extract of malt and expresses the belief that the method outlined in the B. P. C. is not economical.—*Pharm. J. Lond.*, 1907, v. 25, pp. 731-732.

Alcock, F. H., discusses the determination of nitrogen in malt extract, and calls attention to some precautions that must be observed in determining nitrogen by means of the Kjeldahl process.—*Ibid.*, v. 24, p. 205.

Rodwell, Henry, discusses the use of extract of malt as a vehicle for various medicines and presents formulas for a number of combinations of potent medicaments with malt.—*Ibid.*, v. 24, p. 452.

Rodwell, Henry, suggests a number of formulas for malt extract preparations.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 426.

MANGANI DIOXIDUM PRÆCIPITATUM.

von Jaksch R., (München. med. Wchnschr., v. 54, No. 20) states that the breathing of dust laden with particles of manganese dioxide causes a peculiar nervous affection which von Jaksch describes.—*J. Am. M. Ass.*, 1907, v. 49, p. 447.

MANGANI SULPHAS.

Blome, Walter H., (com. on adulterations) reports a sample of manganese sulphate containing a trace of zinc.—*Proc. Michigan Pharm. Ass.*, 1907, p. 69.

MANNA.

Carles, N. P., discusses the use of manna as an excipient for pills.—*Schweiz. Wchnschr. f. Chem. u. Pharm.*, Zürich, 1907, v. 45, p. 553.

Carletti, O. (*Boll. Chim. Farm.*, 1907, 5), gives the following test for the purity of manna: A few cc. of strong sulphuric acid are mixed in a test tube with a few drops of a 1 per cent alcoholic solution of menthol, thymol, naphthol, or some other phenolic body. A little of a 2 per cent solution of the mannite to be tested is cautiously floated on the surface of this. If glucose, saccharose, or other carbo-

hydrate be present as impurity a rose to violet-color zone will be formed. The reaction depends on the fact that mannite does not form furfural when treated with strong sulphuric acid, whereas other carbo-hydrates, under similar conditions, give that aldehyde.—Pharm. J. Lond., 1907, v. 24, p. 457.

MARRUBIUM.

Farwell, O. A., reports that some bales of hoarhound recently imported from Europe were found to contain a considerable percentage of some hoary plant that looked very much like a species of *Salvia*; but as the plants were young and had not yet reached the flowering stage their identity could not be determined.—Merck's Report, N. Y., 1907, v. 16, p. 221.

Gordin, H. M., points out that Matusow's method for extracting marrubin from hoarhound really yields potassium nitrate, and records some observations on the chemistry of marrubin and marrubic acid.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 485.

MASSA FERRI CARBONATIS.

Franklin, J. H., outlines a new method of preparing saccharated carbonate of iron, and makes some suggestions as to the possibility of its use in pharmacy.—Pharm. J. Lond., 1907, v. 25, pp. 114–115.

Crewe, Philip H., discusses the determination of ferrous carbonate in saccharated carbonate of iron, and also the determination of the same salt in the pills of ferrous carbonate.—*Ibid.*, v. 25, pp. 115–117, 134.

MASSA HYDRARGYRI.

An editorial calls attention to the article of Beverly Robinson in the *Monthly Cyclopedia of Practical Medicine* for May, in which he states that the headaches following certain indiscretions of diet require blue mass followed by a saline draught.—N. York M. J., 1907, v. 85, pp. 1183–1184.

MATICO.

Kramer, Hans, describes and illustrates the structural characteristics of matico leaf, whole and powdered.—Ber. d. pharm. Gesellsch., Berl., 1907, v. 17, pp. 329–332.

MATRICARIA.

A review of the wholesale drug market points out that really desirable German chamomile flowers are extremely scarce. The drug as marketed from Hungary is much inferior to that produced in Germany.—Chem. Ztg., Cöthen, 1907, v. 40, p. 77.

Kinyon, C. B., suggests the use of chamomilla when the patient, before menstruation, is very irritable. Snaps at everybody and can hardly keep her temper.—*Tr. Am. Inst., Homœop.*, 1907, 63rd. session, p. 384.

MEL DEPURATUM.

Utz discusses the utility of Ley's reaction for differentiating natural from artificial honey. He concludes that in mixtures of these two substances the presence of the adulterant can not be determined unless upward of 25 to 30 per cent is present.—*Ztschr. f. ang. Chem.*, 1907, v. 20, pp. 993-996.

Thurston, Azor, discusses the use of the polariscope in connection with the determination of the purity of honey, and outlines methods for its application.—*Merck's Report*, N. Y., 1907, v. 16, pp. 123-124.

Lehmann and Stadlinger discuss some criticisms that have been offered on Haehnle's method of testing honey, and point out that the method appears to be open to serious objections.—*Ztschr. f. Unters. d. Nahr. u. Genussm.*, 1907, v. 14, pp. 643-651.

Utz reviews the literature relating to the mineral content of honey, and presents a table giving the probable origin of the honey, and its per cent content of mineral matter.—*Ztschr. f. ang. Chem., Berl.*, 1907, v. 20, pp. 2222-2225.

An editorial (*Annales de Chim. Analyt.*, 12, 258) discussing the method of examination prescribed in French official laboratories, suggests that to insure thorough bulking the honey should if possible be melted and stirred up before drawing the sample. Twenty-five gms. is then weighed off, dissolved in water, and made up to 250 cc. A portion of this solution is at once centrifugated and the deposit obtained examined under the microscope. No starch grains should be seen. Clean honey should contain no portion of the organs of bees; only pollen grains and particles of wax should be found.—*Year-Book of Pharm., Lond.*, 1907, p. 78.

MENTHÆ PIPERITÆ.

An unsigned article discusses the cultivation of peppermint in Wisconsin.—*Paint, Oil and Drug Rev.*, Chicago, 1907, v. 44, November 6, p. 18.

Sharp, Hunter, American consul at Kobe, presents some information on the growing of the peppermint plant and the extracting of the oil.—*Pharm. J. Lond.*, 1907, v. 24, p. 204.

MENTHOL.

Babbitt, E. G., American vice-consul at Yokohama, presents information regarding the production of menthol in Japan and the quantity exported in 1904 and 1905 to various countries from the ports of Japan.—*Pharm. J. Lond.*, 1907, v. 24, p. 204.

Consul Hunter Sharp, writing from Kobe, points out that the peppermint plant yields crops three times a year. The quantity of the product to make 1 kin (1½ pounds) is: First crop, 141 pounds; second crop, 83 to 108 pounds; and third crop, 83 to 91 pounds. The oil from the first crop will yield 45 per cent menthol; the second, 47½ per cent; and the third, 50 per cent.—*Paint, Oil and Drug Rev.*, Chicago, 1907, v. 43, Feb. 6, p. 18.

A review of the menthol production gives the amount, value, and destination of the menthol produced in Japan during the years 1902–1906, inclusive.—*Chem. Ind.*, Berl., 1907, v. 30, p. 401.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 73–74) point out that in Japan menthol is not much used, the bulk being exported. A table is given showing the total export from 1902 to 1906 to the various countries.

They also note (*Ibid.*, October, 1907, p. 103) that the following requirements are given in the new Ph. Dan. for menthol: Colorless, brittle, needle-shaped crystals, not moist. Melting point, 43°; boiling point, 212°; only very slightly soluble in water; very readily soluble in alcohol, ether, chloroform, and fatty oils. When heated in an open dish on a water bath, menthol should evaporate completely. They add that the melting point of menthol lies between 43.5° and 44.5° C., and that it boils about 217° if the mercury thread of the thermometer is entirely placed in the steam.

Risser, Arthur S., states that he has found menthol very useful in the treatment of the vomiting of pregnancy. He enumerates a considerable number of drugs which are used for this purpose.—*N. York M. J.*, 1907, v. 86, pp. 1209–1216.

METHYLTHIONINÆ HYDROCHLORIDUM.

Francis, John M., points out that methylene blue is probably the most abused of all of the medicinal substances now in use. Competition of the pharmaceutical manufacturers has gradually reduced not only the price but also the quality of this substance. The manufacturers have kept pace with this demand for an article at a lesser price by supplying a product not so highly refined, and they have also cheapened it by diluting with dextrin and other substances. Five of the samples examined in the last twelve months contained approximately 30 per cent of this diluent, and it may be of interest to note that the tests given by the Pharmacopœia would not detect this adulterant. The most common contamination, however, is zinc, which is frequently present.—*Merck's Report*, N. Y., 1907, v. 16, p. 65.

Troxell, H. L., (com. on adulterations) asserts that the amount of ash given in the U. S. P. is rather low, for samples were found which contained as much as two or three times the allowed quantity

of ash, but this was not derived from zinc salts.—Proc. Maryland Pharm. Ass., 1907, p. 87.

Blome, Walter H., (com. on adulterations) reports that only 2 out of 17 samples were free from zinc; some contained iron in addition.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Caspari, Chas. E., (com. on adulterations) examined 4 samples, 3 satisfactory; 1 contained zinc.—Proc. Missouri Pharm. Ass., 1907, p. 142.

Vanderkleed, Charles E., (com. on adulterations) reports several samples of methylene blue containing as much as 25 per cent of dextrin. He suggests that all lots be carefully tested for zinc, and points out that complete solubility in alcohol is a satisfactory test.—Proc. Pennsylvania Pharm. Ass., 1907, p. 85.

Frouin, Albert, discusses the antagonism between methylene blue and phloridzin.—Compt. rend Soc. de biol. Par., 1907, v. 62, p. 411.

Slack, Henry R., is reported to have said that he had used methyl thionine hydrochloride in the treatment of cancer with excellent results, several of the patients having remained cured for three years. It relieves pain, the general health of the patients is improved, and years are added to their lives.—J. Am. M. Ass., 1907, v. 48, p. 1626.

MEZEREUM.

Raue, C. Sigmund, employs mezereum in eruptions forming thick, brownish crusts, with oozing of pus; painful at night; swelling of the shafts of the long bones; syphilitic neuralgia.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 528.

MISTURÆ.

MISTURA ADSTRINGENS ET ESCHAROTICA N. F.

Schulze, Louis, believes that the N. F. direction to dispense the clear supernatant liquid for Villati's solution is a mistake and contrary to the wishes of veterinarians.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 179.

MISTURA CAMPHORÆ ACIDA N. F.

Caldwell, Paul, says that one ounce of Hope's mixture contains one-half grain of powdered opium.—Drug. Circ., N. Y., 1907, v. 51, p. 205.

MISTURA CARMINATIVA N. F.

Caldwell, Paul, says that one ounce of Dalby's carminative contains $1\frac{1}{2}$ grains of powdered opium and 3 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

MISTURA CHLORALI ET POTASSII BROMIDI N. F.

Caldwell, Paul, says that one ounce of compound mixture of chloral and bromide contains 90 grains of hydrated chloral and 1 grain of extract of cannabis indica.—Drug. Circ., N. Y., 1907, v. 51, p. 205.

Benfield points out that the mixture of chloral and potassium bromide, N. F., is not very palatable. He proposes to modify the recipe by the addition of 60 cc. of tincture of orange peel U. S. P., 30 cc. fluid extract of glycyrrhiza, 60 cc. of glycerin, and 350 gms. sugar, these ingredients replacing the water in the present formula.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, p. 121.

MISTURA CONTRA DIARRHŒAM N. F.

Caldwell, Paul, says that one ounce of Lafayette mixture contains $2\frac{1}{10}$ grains of ethyl nitrite and 22 per cent of alcohol. He also points out that 1 ounce of Chapman's mixture contains $4\frac{1}{2}$ grains of ethyl nitrite and 30 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

MISTURA CONTRA DIARRHŒAM, N. F.

Lowe, C. B., regrets the continuance of "Diarrhœa mixtures" in the N. F. on the ground that it is not advisable to give opium at first in diarrhœal complaints.—Am. J. Pharm., Phila., 1907, v. 79, p. 246.

Caldwell, Paul, says that one ounce of "Sun" diarrhœa mixture contains 10 grains of powdered opium and 81 per cent of alcohol.

One ounce of Squibb's diarrhœa mixture contains 10 grains of powdered opium, 38 minims of chloroform, and 87 per cent of alcohol.

One ounce of Loomis' diarrhœa mixture contains three-fifths grain of powdered opium and 60 per cent of alcohol.

One ounce of Thielmann's diarrhœa mixture contains $1\frac{1}{4}$ grains of powdered opium, 1 dram of ether, and 55 per cent of alcohol.

One ounce of Velpéau's diarrhœa mixture contains 15 grains of powdered opium and 33 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

MISTURA FERRI COMPOSITA.

Franklin, J. H., (Trans. Brit. Pharm. Conf. (Yearbook of Pharmacy) 1907, 438) suggests a modification of the Ph. Brit. formula for compound iron mixture, which becomes possible with the use of the saccharated carbonate of iron, also modified as proposed by him.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 103.

MISTURA OLEI PICIS N. F.

Caldwell, Paul, says that one ounce of mixture of oil of tar contains 5 minims of chloroform and 16 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

MISTURA OLEO-BALSAMICA N. F.

Beringer, George M., calls attention to and deprecates the changes that have been made in the formula for oleo-balsamic mixture N. F. and the continuance of the Ph. Germ. title as a synonym.—Am. J. Pharm., Phila., 1907, v. 79, p. 364.

MISTURA PECTORALIS, STOKES N. F.

Caldwell, Paul, says that one ounce of Stokes' expectorant contains three-eighths grain of powdered opium and 14 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

MISTURA SASSAFRAS ET OPII N. F.

Caldwell, Paul, says that one ounce of Godfrey's cordial contains 1½ grains of powdered opium and 7 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

MORPHINA.

Bucherer, Hans Th., presents a preliminary communication on the constitution of morphine and of thebaine.—J. f. prakt. Chem., Leipz., 1907, v. 76, pp. 428-432.

Knorr and Hörlein discuss the chemistry of morphine and of the morphine alkaloids.—Ber. d. deutsch. Chem. Gesellsch., 1907, v. 40, III, pp. 3341-3345.

Knorr, Ludwig, contributes a study on the knowledge of morphine and discusses allopseudocodeine, a new isomer of codeine.—*Ibid.*, v. 40, III, pp. 3844-3851.

Pschorr and Einbeck discuss the constitution of morphine and the constitution of oxymethyl-morphimethine.—*Ibid.*, v. 40, pp. 1980-1983.

Lees, Frederic Herbert, presents some additional researches on morphine, and calls attention to the relationship between the isomerides of morphine and codeine, isolated by the author and his collaborators, to each other and to the parent bases.—Pharm. J. Lond., 1907, v. 25, p. 598.

Vongerichten and Hübner discuss the action of halogens on morphine derivatives and report a number of experiments.—Ber. d. deutsch. Chem. Gesellsch., 1907, v. 40, III, pp. 2827-2831, 4146-4154.

Lees, Frederic Herbert, reports his researches on morphine, the halogen derivatives of morphine and codeine and the products of

their hydrolysis.—*J. Chem. Soc., Lond.*, 1907, v. 91, pp. 1408–1418. (See also *Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 176.)

Thurston, Azor, asserts that morphine is lævogryate in alcoholic solution.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

Tickle, Thomas, discusses the separation of morphine from its aqueous solution by shaking with a nonmiscible liquid and reports a number of experiments with various solvents. He outlines a process which entails the use of cresol or mixtures containing cresol as a solvent for the alkaloid.—*Pharm. J. Lond.*, 1907, v. 24, pp. 162–164.

An editorial discusses a communication by Thomas Tickle on "The assay of morphine" and points out some of the original features contained therein.—*Ibid.*, v. 24, p. 160.

Matthes and Rammstedt report a number of experiments with picrolonic acid as a precipitant for morphine and its use for the quantitative determination of morphine.—*Ztschr. f. anal. Chem. Wiesb.*, 1907, v. 46, p. 573.

Warren and Weiss describe and figure morphine picrolonate and discuss the use of picrolonic acid as a precipitant for morphine. A solution 1 in 500 of morphine gives a positive precipitate with picrolonic acid, in fifteen minutes.—*Journ. Biol. Chem.*, N. Y., 1907, v. 3, p. 334.

Scholtz, M., reviews the method proposed by Georges and Gascard for the determination of minute quantities of morphine in solutions.—*Chem. Ztschr.*, 1907, v. 6, p. 155.

Guild, Edward J., asserts that the solubility of morphine in water has been greatly overstated by many observers; the cause of this he believes to be the presence of small traces of codeine. He found the solubility to vary from 1 in 5,110 to 1 in 5,310 at 20° C. Owing to the small residue of morphine to be weighed it is difficult to obtain an absolutely precise figure, but 1 in 5,200 at 20° C. is very near the actual solubility of hydrated morphine in water. The melting point he believes to be in the neighborhood of 235° C.—*Pharm. J. Lond.*, 1907, v. 24, p. 357.

Marchionneschi, M., (*Bollet. Chimico Farmaceut.*, p. 389) reviews the statements regarding the solubility of morphine in ether and reports his own experiments, which tend to confirm the statement by Beilstein that 100 parts of ether at 10° will dissolve 0.23 gm. of morphine.—*Apoth. Ztg., Berl.*, 1907, v. 22, p. 544.

Grübler, M., points out that many, if not all, of the glass vials used by apothecaries contain sufficient amount of free alkali to precipitate solutions of morphine, particularly if the solutions be concentrated and sterilized in the container. He particularly cautions against the dispensing of a solution of morphine that has been even slightly colored by sterilization.—*Pharm. Post. Wien*, 1907, v. 40, pp. 579–582.

Caldwell, Paul, says that one ounce of solution of morphine citrate contains 16 grains of morphine citrate and 12 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 204.

Hausmann, W., reviews some of the literature relating to the habituation of the animal organism to the use of morphine and its derivatives.—*Ergeb. d. Physiol.*, 1907, v. 6, pp. 94–98.

Strangman, Mary S. P., reports a case of morphinomania treated successfully with atropine and strychnine.—*Merck's Arch.*, N. Y., 1907, v. 9, pp. 282–283.

Roch has studied the employment of atropine in acute intoxication by morphine. Atropine really combats morphine narcotism if therapeutic doses be adhered to and the antidotal quantities administered be not exceeded, which would naturally superpose a second intoxication upon the first.—*J. de pharm. et de chim. Par.*, 1907, v. 25, p. 550.

Douglas, Charles J., describes a plan for the treatment of morphinism whereby the patient is kept under the influence of various hypnotics during the period of morphine withdrawal and the pain of withdrawal is obviated. When the patient awakes all desire for morphine is said to be gone.—*Med. Rec. N. Y.*, 1907, v. 72, pp. 435–437.

Vinci, Gaetano, discusses the action of morphine and some of its derivatives on the isolated mammalian heart, including dionin, peronin, and heroin, with protocols of experiments and a bibliography.—*Arch. internat. de pharmacod. et de therap. Par.*, 1907, v. 17, pp. 5–63.

An editorial discusses the literature relating to the action of morphine on the gastrointestinal canal briefly and calls attention to the recent work of Magnus, who found that the morphine caused the food to remain in the stomach for a longer period of time. The effect of small doses on the intestine was stimulating, while large doses slowed or stopped peristalsis.—*J. Am. M. Ass.*, 1907, v. 49, p. 777.

Knopf, S. A., disclaims that he ever advised the use of morphine to hasten the death by painless means of tuberculous patients, and states that, despite efforts to correct the erroneous impression given by the press, the ordeal has become almost unbearable.—*Ibid.*, v. 49, p. 616.

Additional references on the use of morphine will be found in the *Index Medicus* and the *J. Am. M. Ass.*

NONOFFICIAL COMPOUNDS.

Fauntleroy, C. M., reports a case of heroinism in which a man was taking up to 10 grains daily. Under treatment the amount was gradually reduced, strychnine being used at the same time.—*N. York M. J.*, 1907, v. 86, p. 930.

The Council on Pharmacy and Chemistry describes diacetylmorphine hydrochloride, which is sold as heroin. The heroin habit is sometimes treated by substituting morphine, and then treating the morphine habit in the usual way.—J. Am. M. Ass., 1907, v. 48, p. 1185.

The editor of the Therapeutics column quotes Paul Duhem, in *Progrès Médicale*, to the effect that herein addiction has been observed with increasing frequency since its employment in the treatment of the morphine habit.—*Ibid.*, v. 48, p. 1211.

The Council on Pharmacy and Chemistry describes ethylmorphine hydrochloride, which was introduced under the name of dionin.—*Ibid.*, v. 48, p. 1109.

MORPHINÆ ACETAS.

Thurston, Azor, asserts that morphine acetate is lævogyrate in aqueous or alcoholic solutions.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Blome, Walter H., (com. on adulterations) says that the solubility of morphine acetate varies, due largely to loss of acetic acid.—Proc. Michigan Pharm. Ass., 1907, p. 69.

MORPHINÆ HYDROCHLORIDUM.

Frerichs, G., recommends the use of the following test for the identity of morphine: A particle of morphine hydrochloride in a mixture of 2 cc. of sulphuric acid and 3 to 4 drops of solution of formaldehyde produces a red-violet, changing to blue violet and later deep blue color.—Apoth. Ztg., Berl., 1907, v. 22, p. 213.

Philipp Röder (Jahresbericht, Wien, 1907, p. 91) reports that of 4 samples of morphine hydrochloride 1 was rejected because of the brown color imparted to the resulting solution.

Pegurier, G., (Répert. pharm., 3, 19, 442-3) found that of 3 samples of sterilized hypodermic morphine chloride tablets 2 gave, as is usually the case, more or less colored solutions, but the third gave an unusually clear solution. An examination showed the latter to contain free HCl, in the proportion of 3 mg. acid of pharmacopœial strength per 1 cc.—Chem. Abstr. Am. Chem. Soc., 1908, v. 2, p. 691.

Prunier (Rép. de Pharm., 1907, No. 10) recalls the fact that sterilized morphine solutions are rendered very stable by the addition of a very slight excess of hydrochloric acid. He found such solutions having acid reactions to retain their water-bright and colorless condition when preserved in sealed vials (ampuls) for three years, whereas neutral solutions preserved in the same way had acquired a more or less brown color.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 94.

Marie, A., discusses the sensibility of the cerebral cells to morphine hydrochloride and gives a tabulated summary of his results with subcutaneous and intracerebral injections.—Compt. rend. Soc. de biol. Par., 1907, v. 63, pp. 381-382.

MORPHINÆ SULPHAS.

Thurston, Azor, asserts that morphine sulphate is levogyrate in aqueous solution.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Blome, Walter H., (com. on adulterations) says that the solubility of morphine sulphate varies.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Caldwell, Paul, points out that one ounce of Magendie's solution contains 16 grains of morphine sulphate.—Drug. Circ., N. Y., 1907, v. 51, p. 205.

MOSCHUS.

Schimmel & Co. (Semi-Ann. Rept., April, 1907, p. 112) discuss the conditions of the musk market, together with the causes for increased prices. A table is given showing the export of musk from Shanghai in the year 1906 as compared with that of the years from 1899 to 1905, inclusive.

They call attention to a paper by Zwaardemaker, H. (Koninklijke Akademie van Wetenschappen te Amsterdam, 1907, 31, 139); who has obtained remarkable results in his olfactometric experiments with muskone. He studied the variations of different substances from each other in respect to their capacity for absorbing muskone odor from an atmosphere saturated with muskone vapors. The manner of conducting the experiments is explained.—Schimmel & Co., Semi-Ann. Rept., October, 1907, p. 107, 108.

Aitken (The Oil and Col. Journ., 1907, p. 107) asserts that the odor of musk is due to a conversion of the solid substance into gases, and is not caused by the dissemination of solid particles of the material.—Apoth. Ztg. Berl., 1907, v. 22, p. 119.

MYRISTICA.

A Penang pharmacist describes a visit to Hardouin's estate in Malay Peninsula, where he observed the cultivation of nutmegs.—Chem. & Drug. Lond., 1907, v. 70, p. 139.

Hart, J. H., (Bull. Bot. Dept., Trinidad, No. 54, April, p. 202) reports on the examination of 16-year-old nutmeg trees growing in the grounds of J. W. Crosbie, of Trinidad, which have been observed during the last four years to bear both male and female flowers. His examination proved the presence of both kinds of flowers on the same branch of this tree, and he therefore suggests that an attempt should be made to perpetuate this variety by grafting, since the planter has, as a rule, to wait many years after planting the seed to see whether it will produce a fruit-bearing or a male tree.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 765.

Winton, A. L., points out that so-called grinding nutmegs have been visited before shipment by some insect which, curiously enough,

devours almost completely the starchy part of the nut, leaving the resinous veins untouched. Such nuts may contain an even higher per cent of volatile oil than the sound product.—Proc. Ass. Off. Agric. Chem., 1907, 24th Ann. Conv., p. 81. (Bull. Bur. Chem. U. S. Dept. Agric., 1908, No. 116.)

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 32) examined two samples of powdered nutmegs containing 37.1 and 36.8 per cent of ether-soluble matter.

Kinyon, C. B., asserts that "*Nux moschata*" is frequently called for in hysteria, where *ignatia* is given, also menses irregular both as to time and quantity; discharge is dark and thick, whether in amenorrhœa or menorrhagia. Unconquerable drowsiness, yet can not sleep well. Great lassitude with a tendency to excessive laughter, especially when in the open air.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 389.

MYRRHA.

v. Friedrichs, Oscar, reviews some of the work done in connection with myrrh and reports a chemical examination of myrrh and its several constituents. He found the examined sample of myrrh to consist of volatile oil, resin, gum, and enzyme. The ethereal oil was present to the extent of 8.8 per cent.—Arch. der Pharm., 1907, v. 245, pp. 427-457.

Nelson, Burt E., describes powdered myrrh and enumerates its several constituents.—Merck's Report, N. Y., 1907, v. 16, p. 219.

Brown, J. F., calls attention to the difficulty of powdering myrrh belonging to the class of soft, oily gums described by Parker in 1879. To facilitate the powdering he suggests the addition of dimatos.—Pharm. J. Lond., 1907, v. 25, p. 373.

Lewinsohn, K., (Thesis, Berlin, 1906; Arch. der Pharm., 244, 1906, 412) discusses the composition of myrrh oil. He reports on the examination of 3 samples of commercial oils and emphasizes that the composition of myrrh oil differs according to the origin of the resin, the method of production, and the age.—Schimmel & Co., Semi-Ann. Rept., April, 1907, pp. 72-73.

Philipp Röder (Jahresbericht, Wien, 1907, p. 78) reports that 8 of the 10 samples examined exceeded the Ph. Austr. VIII 6 per cent limit for ash. The 2 samples accepted contained 3.17 and 5.37 per cent of ash, respectively, while the 8 samples rejected varied from 6.70 to 49.29 per cent.

Brown, Geo. S., reports examining 13 samples of tincture of myrrh. He found the contained extract to vary from 0.250 to 1.150 per cent. A sample of tincture made by the committee on deterioration and adulteration of drugs contained 1.450 per cent of extract. Only 3 samples at all approximated the extract content of the type sample.—Proc. Louisiana Pharm. Ass., 1907, p. 79.

NAPHTHALENUM.

Ditz, Hugo, discusses the reaction given by commercial naphthalin with formaldehyde and concentrated sulphuric acid—Chem. Ztg., Cöthen, 1907, v. 31, p. 446.

Aso, K., (Bull. College of Agriculture, Tokyo, v. 7, pp. 413–417, 1907) reports observations on the action of naphthalin on plants and points out that this substance can retard the development of bacteria without acting as a bactericide. In quantities of from 0.005 to 0.01 per cent it may have a stimulating effect, but in quantities of 0.05 it was in all cases harmful.—Bot. Centralbl., 1907, v. 105, p. 402.

NUX VOMICA.

Greenish, Henry G., points out that the international agreement requires the drug to contain 2.5 per cent of total alkaloid. All the pharmacopœias adopt this alkaloidal standard with the exception of the U. S., which standardizes to 1.25 per cent of strychnine. The committee of reference considered standardization in terms of strychnine to be essential, inasmuch as the toxicity of the drug is almost entirely due to this alkaloid, and the proportion of it in the total alkaloid varies within somewhat wide limits, viz., from 35 to 50 per cent.—Pharm. J. Lond., 1907, v. 24, p. 832.

The Committee of Reference in Pharmacy points out that the standardization of nux vomica to 2.5 per cent of total alkaloid, as required by the international agreement, can easily be complied with, but the step is a very retrograde one. They hold that at least the preparations of this drug should be standardized in terms of strychnine.—Chem. & Drug. Lond., 1907, v. 70, p. 587.

Hafner, B., discusses the assay of nux vomica and of several official preparations and points out that the Ph. Austr. VIII method gives generally low and altogether unreliable results.—Ztschr. d. allg. österr. Apoth. Ver., Wien, 1907, v. 45, pp. 327–329.

Alcock, F. H., discusses the published assay methods for nux vomica and points out that the Ph. Brit. method for the assay of nux vomica is unworkable. He submits a simplified process the operations of which he believes to be straightforward and calculated to give concordant results.—Pharm. J. Lond., 1907, v. 24, p. 20.

Webster and Pursel discuss the estimation of strychnine in nux vomica, review the several methods that have been used, and record some experiments made to determine the most desirable modification of the U. S. P. process. They recommend that the alkaloidal residue be dissolved in 15 cc. of 3 per cent sulphuric acid, to which solution equal volumes of nitric acid (S. G. 1.4) and distilled water are to be added and then 1 cc. of a 5 per cent solution of sodium nitrite, after which the solution is to be set aside for 38 minutes, then made alka-

line and shaken out with chloroform.—*Am. J. Pharm., Phila.*, 1907, v. 79, pp. 1-7.

Naylor, W. A. H., reviews the U. S. P. assay method for fluid extract of *nux vomica* and compares it with several others that have been suggested.—*Am. Druggist, N. Y.*, 1907, v. 50, p. 357.

Gordin, H. M., calls attention to the fact that the U. S. P. assay for strychnine in *nux vomica* is not identical with the process published by him in 1902 (*Proc. Am. Pharm. Ass.*, 1902, p. 336), and that the modification was made despite his vigorous protest. He asserts that nitric acid having a specific gravity of 1.42 is readily obtainable and will give uniformly good results.—*Am. J. Pharm., Phila.*, 1907, v. 79, pp. 61-62.

An editorial comments on Gordin's protest against the modification of his method of alkaloidal assay adopted in the U. S. P. VIII for the estimation of strychnine in *nux vomica*.—*Am. Druggist, N. Y.*, 1907, v. 50, p. 128.

Naylor and Chappel discuss the U. S. P. process of assay of fluid extract of *nux vomica* and compare it with the methods proposed by Dewhirst, Dowzard, and Farr and Wright.—*Pharm. J. Lond.*, 1907, v. 24, pp. 394-395.

Fromme, G., points out that the gravimetric estimation of alkaloids in *nux vomica* gives uniformly higher results than does the titrimetric estimation and gives several references.—*Geschäfts Ber.*, v. Cæsar and Loretz in Halle, a. S., 1907, pp. 51-59.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, pp. 32-33) outline a method for the assay of strychnine which they find works very satisfactorily.

Cæsar and Loretz (*Geschäfts Ber.*, 1907, p. 110) outline their method of assay for *nux vomica* and point out that the Ph. Germ., Ph. Belg., Ph. Ndl., and Ph. Austr. require 2.5 per cent of total alkaloid, and that the U. S. P. requires 1.25 per cent of strychnine.

Puckner, W. A., reviews the comments and criticisms made during 1906 on the official assay for *nux vomica*.—*Pharm. Rev., Milwaukee*, 1907, v. 25, pp. 326, 328.

Kwisda, A., reviews the progress that has been made during the year 1906 in the chemistry of the strychnine alkaloids.—*Pharm. Post, Wien*, 1907, v. 40, p. 181.

Matthes and Rammstedt discuss the use of picrolonic acid for the estimation of the alkaloid content of *nux vomica*, the extract, and the tincture.—*Arch. d. Pharm.*, 1907, v. 245, pp. 117-126.

Vanderkleed, Charles E., reports 11 assays of *nux vomica* ranging from 2.090 to 3 per cent of total alkaloid. He asserts that the average of total alkaloid corresponds to about 1.08 per cent strychnine and thinks the standard of 1.25 per cent strychnine difficult to maintain. Drug hard to exhaust.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 89.

Gane, E. H., examined 4 lots of drug, which varied from 1.2 per cent to 1.52 per cent of strychnine.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 328.

Patch, E. L., examined 4 samples ranging from 1.208 per cent to 1.38 per cent.—*Ibid.*, v. 55, p. 328.

Bachman, Gustav, (com. on adulterations) reports nux vomica assaying 1.33 per cent.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Caspari, Chas E., (com. on adulterations) examined 4 samples, 3 satisfactory, 1 weak.—Proc. Missouri Pharm. Ass., 1907, p. 147.

Sayre, L. E., reports on 17 assays of nux vomica which contained from 1.02 to 1.51 per cent of strychnine. Average, 1.30 per cent.—Bull. Kansas Bd. Health, 1907, p. 44.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 33) examined 6 lots of seeds, from which 0.9 to 1.35 per cent of strychnine was obtained. The alkaloid was extracted by alcohol and chloroform after a preliminary treatment of the powdered drug with sodium carbonate.

Philipp Röder (Jahresbericht, Wien, 1907, p. 116) reports on 9 samples of nux vomica which varied from 1.50 to 3.04 per cent of ash, and yielded from 9.06 to 12.19 per cent of extract to 70 per cent alcohol and from 2.50 to 3.13 per cent of total alkaloid.

Greenish, Henry G., points out that the international agreement has adopted standardization to 16 per cent of total alkaloid. The Ph. Austr., Ph. Belg., Ph. Ndl., and Ph. Hisp. have adopted this standard, but the U. S. P. has retained its strength of 5 per cent of strychnine for extract of nux vomica; therefore, complete uniformity has not been attained, although a step in this direction has been made.—Pharm. J., Lond., 1907, v. 24, p. 832.

Philipp Röder, Wien, reports examining 6 samples of extract of nux vomica which varied from 10.38 to 17.56 per cent of total alkaloid according to the method outlined by him the previous year.—Ztschr. d. allg. österr. Apoth.-Ver., Wien., 1907, v. 45, p. 254.

Wright, R., discusses the method for the determination of strychnine in liquid extract of nux vomica proposed by F. H. Alcock, and points out that it is easier to criticise other methods than to discover a flawless substitute. He points out that the two essential qualifications for an acceptable process are, (1) a pure alkaloid, and (2) concordant results.—Pharm. J., Lond., 1907, v. 24, p. 49.

Sayre, L. E., reports 2 assays of fluid extract of nux vomica containing 0.54 and 0.575 per cent of strychnine.—Bull. Kansas Bd. Health, 1907, p. 11.

Ladd, E. F., reports examining 13 samples of fluid extract of nux vomica which varied from 92.5 to 162 per cent of the U. S. P. strength.—Rep. North Dakota Exper. Sta., 1907, Part II, p. 147.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of *nux vomica* as 66.5, 69, 60, 60, and 70 per cent respectively.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 319.

Greenish, Henry G., points out that the international agreement directs the tincture to be made 1 in 10 with 70 per cent alcohol, and to be standardized to 0.25 per cent of total alkaloid. The Ph. Austr., Ph. Belg., Ph. Ndl., and Ph. Hisp. adopt this standard, but the U. S. P. adheres to 0.1 per cent of strychnine.—*Pharm. J.*, Lond., 1907, v. 24, p. 832.

Philipp Röder Wien, criticises the Ph. Austr. VIII assay method for tincture of *nux vomica* and asserts that it frequently gives results that are much too low.—*Pharm. Post*, Wien, 1907, v. 40, p. 376.

Niece, Frederic E., describes a color reaction which he suggests for testing the identity of tincture of *nux vomica*.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 483.

Ladd, E. F., reports examining a number of samples of tincture of *nux vomica* which were found to vary from 70.5 to 496 per cent of U. S. P. strength. He finds that the U. S. P. assay process does not give reliable results, and points out several desirable changes.—*Rep. North Dakota Agric. Exper. Sta.*, 1907, Part II, pp. 145–146.

Baird, J. W., (com. on adulterations) reports 2 samples, adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

Philipp Röder Wien, points out that it is difficult to produce tincture of *nux vomica* containing exactly 0.25 per cent total alkaloids when assayed by the Ph. Austr. VIII method, as the method itself gives variable results.—*Ztschr. d. allg. österr. Apoth.-Ver.*, Wien, 1907, v. 45, p. 285.

Still, G. F., (*Clin. J. Lond.*, Apr. 24) discusses the treatment of enuresis and fecal incontinence and states that *nux vomica* may prove useful in enuresis. He mentions briefly the use of a great variety of drugs.—*J. Am. M. Ass.*, 1907, v. 49, p. 91.

Dunham, John Dudley, states that tincture of *nux vomica* taken before each meal is often helpful in the treatment of gastric neuroses.—*N. York M. J.*, 1907, v. 85, p. 1214.

Adams, E. O., points out that *nux vomica* is indicated in cases of functional indigestion accompanied with its well-known irritability of temper.—*Tr. Am. Inst. Homœop.*, 1907, 66rd session, p. 368.

OLEATUM HYDRARGYRI.

Gilmour, J. P., reports 11 samples of oleate of mercury, all below Ph. Brit. standards; considerable quantity of chloride present, due to insufficient washing of the oleate. He asserts that the present process is clumsy, and the product variable in consistency and sta-

bility, and suggests reverting to the 1868 process, or adopting the U. S. P. modification.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

OLEORESINA CUBEBAE.

Smith, Otis W., thinks that oleoresin of cubeb might well have been included in the class made with acetone, as the drug yields but little to alcohol after it has been thoroughly extracted by acetone. Alcohol is open to the further objection that its boiling point is so high that a considerable loss of the volatile substance from the cubeb occurs when the solvent is evaporated.—Proc. Missouri Pharm. Ass., 1907, p. 134.

OLEUM.

OLEA INFUSA N. F.

Beringer, George M., condemns the N. F. general formula for infused oils and objects to the note as being misleading. He thinks the substitution of equal parts of lard oil and cotton-seed oil for olive oil cannot be too strongly condemned, as it is well known that such mixtures of oil rapidly undergo change and become rancid.—Proc. New Jersey Pharm. Ass., 1907, p. 74.

OLEA PINGUA.

The methods for the analysis of edible fats and oils as outlined by the Association of Official Agricultural Chemists provide for 17 determinations including specific gravity, index of refraction, melting points of fat, iodine absorption number, saponification number, free fatty acids, unsaponifiable residue and quantitative tests.—Bull. Bur. Chem. U. S. Dept. Agric., 1907, No. 107, pp. 129-147.

Bornemann, G., presents a comprehensive report on the chemistry of fats and fatty oils in the second half year of 1906.—Chem. Ztschr., 1907, v. 6, pp. 139-143. (See also *Ibid.*, pp. 277-280, for review of chemistry of fatty oils in the first half year of 1907.)

Suijver, J. F., discusses the official descriptions and the examination of fatty oils and mineral oils directed by the Ph. Ndl. IV.—Pharm. Weekbl., 1907, v. 44, pp. 341-343.

The Ph. Helv. IV outlines a method for determining the acid number, saponification number and iodine number of oils, waxes, and resins.

Sidersky, D., presents a table of the principal physico-chemical constants of fatty matters.—Ann. de chim. analyt., 1907, v. 12, pp. 59-62.

Mascarelli and Blasi (Gaz. chim. ital., 1907, p. 113) say that a comparative study of the several methods for the determination of the

iodine index gives first place to that of Hanus, by the action of bromide of iodine.—*Répert. de pharm., Par.*, 1907, v. 19, p. 223.

Thompson and Dunlop (*Analyst*, 31, 281) prepared a number of pure oils and determined the iodine number by the Wijs method. The oils examined were olive, linseed, ravison, jamba, rape, almond, and castor. They also prepared a table to show that the presence of free fatty acids in an oil tends to lower the index of refraction and the iodine number.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 70.

Louise and Sauvage (*Compt. rend.*, 145, 1907, 183) suggest a new physical constant for fixed oils, which depends on the observation that when a small quantity of acetone is added to a fixed oil the mixture separates on standing into two layers from the formation of a "double mixture."—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 359.

Arragon, Ch., (*Ztschr. f. Unters. d. Nahr. u. Genussm.*, 12, 449) has investigated the green coloration yielded by vegetable oils when shaken with Welman's reagent (10 G. phosphomolybdate of soda, 20 cc. nitric acid specific gravity, 1.153 and water 100 cc.), from which it appears that in addition to vegetable oils some animal oils afford a similar coloration.—*Ibid.*, v. 55, p. 903.

Fanto and Stritar discuss the theory of the saponification process and the reactions that are involved. They report their experiments at some length and conclude that they do not offer any contradiction to the hypothesis that the saponification of fats by alkalies is effected, practically direct.—*Ann. d. Chem., Leipz.*, 1907, v. 351, pp. 332-343.

Marcusson, J., (*Chem. Ber.*, v. 39, p. 3466-3474, 1906) presents a contribution on the theory of saponification and points out that despite the fact that fats are saponified in several stages no intermediary products appear to occur.—*Physikal. Chem. Centralbl.*, 1907, v. 4, p. 47.

Lewkowitsch, J., (*Chem. Ber.*, v. 39, pp. 4095-4097, 1906) also discusses the theory of saponification processes and controverts some of the theories proposed by Marcusson.—*Ibid.*, v. 4, p. 48.

An abstract (from Oil, Paint, and Colorman) calls attention to a fuller's earth found in Florida which is recommended for the bleaching of fats and oils. The method of preparing and using the substance is outlined.—*Drug. Topics*, New York, 1907, v. 22, p. 100.

OLEA VOLATILA.

Charabot and Laloue discuss the formation and distribution of essential oil in a living plant (*Artemisia absinthium* L.).—*Compt. rend., Acad. d. sc. Par.*, 1907, v. 144, pp. 152-154.

The same authors also present a paper on the successive distributions of terpenic compounds among the several organs of the living

plant.—*Ibid.*, pp. 435–437. (See also Bull. de la Soc. de chim. de France, Par., 1907, v. 1, pp. 280–290.)

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 112–113) quote Etienne (Journ. de la Soc. nat. d'Horticulture de France, Feb., 1907) as asserting that the constituents scientifically detected in certain natural blossom oils, such as methyl ester of anthranilic acid, benzyl acetate, and geraniol, are not at all present in the natural products in which they had been discovered.

The comments by Schimmel & Co. on the volatile oils in the Ph. Belg. III are reprinted, and attention is called to the statement that, because of the corrections that were made possible by the preliminary publication of the monographs on essential oils, the Ph. Belg. III is singularly free from the glaring errors so common in some of the other official descriptions of essential oils.—Bull. Soc. roy. de pharm. Brux., 1907, v. 51, pp. 41–44.

Greenish, Henry G., points out that the tests for volatile oils in the Ph. Dan. VII are very briefly dealt with, being usually restricted to the solubility and limits of specific gravity.—Pharm. J. Lond., 1907, v. 25, p. 463.

While requirements for optical rotation of volatile oils are not included in the Ph. Helv. IV, a table containing the optical rotation of the more important oils is included in the appendix.

Brandel, I. W., reviews the literature of volatile oils for the period of 1905.—Pharm. Rev., Milwaukee, 1907, v. 25, pp. 58–64, 121–128, 147–154, 180–187, 296–298.

Rochussen, F., reviews the progress that has been made in the field of essential oils, particularly the chemistry of these compounds.—Chem. Ztg. Cöthen, 1907, v. 31, p. 223–225, 239–241.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 113–114) review Semmler's text-book on "Die ätherischen Öle, nach ihren Bestandteilen, unter Berücksichtigung der geschichtlichen Entwicklung," the final number of which appeared at the end of June, 1907. They call attention especially to 3 volumes devoted to methane derivatives, hydrated compounds, and benzene derivatives.

Beckmann (Arch. der Phar., 245, 1907, 211) publishes a detailed treatise on the cryoscopic method for determining the essential oils in spices, etc.—Schimmel & Co. Semi-Ann. Rep., October, 1907, pp. 114–116.

Ossendowsky, A. M., (J. Russ. Phys. Chem. Soc., 38, 1073–74) presents a table of the rotation and density of 15 oriental oils.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1456.

Thurston, Azor, discusses the application of the polariscope to the detection of adulteration of volatile oils and presents a list of volatile

oils and their optical rotation.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Vanderkleed, Charles E., believes that with few exceptions the tests for volatile oils laid down in the U. S. P. VIII, and its revision under pamphlet of very recent date, practically cover this subject in an intelligent and practical way. He points out that the main trouble with all these tests is that they consume quite a quantity of a rather expensive article and, of course, a good deal of time, so that, after all is said and done, the label of a first-class, honorable house is the best guaranty that ordinarily could be asked for.—Proc. Pennsylvania Pharm. Ass., 1907, p. 58.

Bernegau, Henry, discusses some of the characteristics of volatile oils and the standards required by the U. S. P.—Am. J. Pharm., Phila., 1907, v. 79, p. 554.

Troxell, H. L., (com. on adulterations) points out that as a whole, essential oils show up very fine, although from time to time slight discrepancies occur.—Proc. Maryland Pharm. Ass., 1907, p. 87.

Blair, Henry C., discusses the adulteration of volatile oils and presents a number of formulas formerly used by manufacturers of spurious oils.—Proc. Pennsylvania Pharm. Ass., 1907, pp. 66–69.

Vanderkleed, Charles E., quotes a correspondent who describes a number of adulterants for volatile oils, the method of their use and their possible detection.—*Ibid.*, 1907, p. 58.

Gane, E. H., quotes C. T. Bennett as asserting that artificial esters are prepared for the express purpose of sophisticating essential oils. Ethyl succinate for oil of lavender, glycerol acetate for oil of peppermint, ethyl citrate, an odorless product of high boiling point, for use in oil of bergamot, oil of lavender, etc.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 320.

Mossler, Gustav, reports a number of experiments and observations on the action of bromine on ethereal oils and the subsequent determination of the absorbed bromine.—Ztschr. d. allg. österr. Apoth.-Ver. Wien, 1907, v. 45, pp. 223–225, 235–236, 251–253, 267–269, 283–285, 299–301.

Harries and Himmelmann present a communication on the chemistry of citral and its behavior with ozone.—Ber. d. deut. chem. Gesellsch., 1907, v. 40, III, pp. 2823–2826.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 120–123) discuss and outline a new method worked out by Rother for the determination of aldehydes and ketones.

Boulez, Victor, presents a study of the esterification of tertiary terpene alcohols, particularly linalol and the determination of that alcohol in essential oils.—Bull. de la Soc. de chim. de France, Par., 1907, v. 1, pp. 117–120.

Simmons, W. H., points out the need of a really satisfactory method for the determination of linalol in essential oils and records some observations and experiments with linalol and linalol oils.—Chem. & Drug. Lond., 1907, v. 70, p. 496.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 119–120) quote Parry and Bennett as having experimented with Boulez's method for the determination of linalol, from which they conclude that this method does not give reliable results.

They assert (*Ibid.*, April, 1907, p. 118) that the method for the determination of phenols indicated by Gildemeister, extraction with 5 per cent soda liquor for thyme oil, has given the best results.

They also discuss (*Ibid.*, October, 1907, p. 117) the reports by Tschugaeff (Berl. Berichte, 35, 1902, 3912), Hibbert and Sudborough (Proc. chem. Soc., 19, 1903, 285; Chem. Centralbl., 1904, I, 402) and Zerewitinoff, Th. (Berl. Berichte, 40, 1907, 2023), on the use of magnesium methyl iodide as a reagent in the hydroxyl group.

Semmler, F. W., presents a series of contributions on the constituents of ethereal oils.—Ber. d. deut. chem. Gesellsch., 1907, v. 40, III, pp. 2959–2968. (See also Semmler and Tollens, *Ibid.*, 1907, v. 40, III, pp. 3101–3106; Semmler, F. W., *Ibid.*, v. 40, III, pp. 3321–3324; Semmler and Hoffmann, *Ibid.*, v. 40, III, pp. 3521–3528; Semmler and Bartelt, *Ibid.*, v. 40, III, pp. 4465–4472; Semmler, F. W., *Ibid.*, v. 40, III, pp. 4591–4597; Semmler and Bartelt, *Ibid.*, v. 40, III, pp. 4844–4849; Semmler, F. W., *Ibid.*, v. 40, III, pp. 5017–5023.)

Wallach, O., presents a series of contributions to our knowledge of the terpenes and volatile oils.—Ann. d. Chem. Leipz., 1907, v. 353, pp. 284–334. (See also v. 357, pp. 49–78; v. 359, pp. 265, 286; v. 360, pp. 26–104; v. 363, pp. 1–19.)

Deusen and Lewinsohn present a contribution to our knowledge of the sesquiterpenes.—*Ibid.*, v. 359, pp. 245–264.

Wendt, Gustav, reviews some of the opinions regarding the constitution of the terpene series and presents a number of constitutional formulas for compounds of this series.—Pharm. Ztg., Berl., 1907, v. 52, pp. 331–332.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 111–112) assert that the formulas by Wendt are presented without any experimental foundation, entirely arbitrarily, and with sovereign disregard of all previous labor, upon a "pure" carbon atom; that is to say, a carbon atom combined in his opinion with four others.

Overman and Sayre present some observations on the antiseptic value of volatile oils.—Merck's Report, N. Y., 1907, v. 16, pp. 279–280.

Kobert, Karl, discusses the antiseptic value of terpene free and terpene containing ethereal oils. He concludes that as antiseptics the terpene free oils are quite as efficient as the terpene containing oils.

He presents tables giving the comparative value of the several oils.—Pharm. Post., Wien, 1907, v. 40, pp. 627–630. (See also Merck's Report, N. Y., 1907, v. 16, pp. 73–75.)

OLEUM ADIPIS.

Graham, Willard, reports on an examination of 3 samples of lard oil, 2 of which were abnormal in acid number, and asserts that a good lard oil should have an acid number of not over 5.—Proc. Pennsylvania Pharm. Ass., 1907, p. 237.

OLEUM AMYGDALÆ AMARÆ.

Cohn, Alfred I., thinks that the name for this product might well be changed to oleum amaræ amygdalæ, or better yet oleum amygdalæ volatilæ. The latter name would correspond with the name that has been adopted for the fixed oil of almonds and would have the advantage of being in keeping with scientific accuracy.—Proc. New York Pharm. Ass., 1907, p. 234.

Brandel, I. W., gives the pharmacopœial requirements as they appear in the U. S. P. VIII, and the Ph. Hisp. VII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 63.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 13) discuss the action of emulsin on amygdalin. They point out that after some time there occurs a state of equilibrium; the formation of hydrocyanic acid ceases, although the enzyme and also amygdalin are still present.

Lemoine, A., (Lab. Inland Rev. Dept., Canada, Bul., 136, p. 10) examined 65 samples of almond extract, 61 of which were entirely free from prussic acid, 3 contained measurable amounts, and 1 a trace only. Nine of the samples contained added dyes.—Exp. Sta. Rec., 1907–1908, v. 19, p. 968.

OLEUM AMYGDALÆ EXPRESSUM.

Francis, John M., points out that while thousands of gallons of a comparatively cheap sweet almond oil were obtainable 18 months ago this is no longer the case.—Proc. Pennsylvania Pharm. Ass., 1907, p. 64.

Gausby, R. A., reports that no adulteration was noted in the several samples examined, but that several lots from reliable pressers ran below the U. S. P. limit as to iodine value. He reports the following data from seven samples examined: Acid number from 0.53 to 2.81; saponification number from 188.4 to 190.2; iodine number from 91.1 to 94.8. Also reports the examination of one sample of peach-kernel oil which contained a considerable quantity of poppy oil.—*Ibid.*, 1907, p. 78.

Hankey, William T., asserts that oil of peach kernels and even oil of peach kernels mixed with oil of sesame and cotton seed oil is frequently sold for pure almond oil.—*Ibid.*, 1907, p. 72.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 5) have, very occasionally, noticed a slight pinkish tinge in pure almond oils. French oils have a specific gravity 0.924 and a refraction figure +25. Spanish oils have a specific gravity of 0.916 and a refraction figure +5.

Schimmel & Co. (Semi-Ann. Rep., October, 1907) describe an oil of sweet apricot kernels, from the island of Mallorca. They point out that this oil also differs from the genuine almond oil above all by the elaidine test, in which the (solid) layer of oil is not colorless, but, as in the case of peach-kernel oil, reddish.

A review of the Syrian market of apricot kernels in Schimmel's Report for April, 1907, 10–11, gives some idea of the extent of the substitution of apricot kernels for almonds in the production of the almond oil of commerce.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 904.

OLEUM ANISI.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 101) point out that the U. S. P. corrections up to June 1, 1907, provide that oil of anise should have a specific gravity of 0.975 to 0.988 and optical rotation to -2 at 25° C.

Bernegau, Henry, points out that oil of anise is required to conform to an angle of rotation -2 in a 100 mm. tube at 25° C. (absence of oil of fennel) but that no indication is given under the description of the latter oil as to what optical rotation, if any, it should have.—Am. J. Pharm., Phila., 1907, v. 79, p. 555.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 101) recommend determining the specific gravity of anise oil at 20° , as anise oil sometimes solidifies already spontaneously at 15° ; the above limits of value also apply to 15° .

Peltriset, C. N., discusses star anise and its culture in Tonkin.—Bull. d. sc. pharmacol., Par., 1907, v. 14, pp. 277–282.

Hartwich, C., reports finding a considerable amount of poisonous star anise, reviews some of the literature relating to it, and describes with figures the structural characteristics of several varieties of *illicium*.—Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, pp. 798, 809.

Beuttner, E., reports finding a sample of star anise contaminated with 50 per cent of the poisonous *sikimi* fruit.—*Ibid.*, v. 45, pp. 277–282.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, p. 96) point out that inferior oil of star anise is rarely shipped from China, and that most of the oil on the market is of good quality.

Gausby, R. A., points out that oil of anise is usually of good quality. Reports one case which showed slightly dextrogyrate and a melting point barely 15° C.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 76.

Blome, Walter H., (com. on adulterations) reports the examination of 5 samples. Congealing point from 12° to 13.5° C.—*Proc. Michigan Pharm. Ass.*, 1907, p. 69.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 6) examined two questionable samples which tested as follows: Specific gravity 0.984, 0.988; optical rotation $+0^{\circ} 24' - 4^{\circ} 4'$; melting point 14.5° C., 11° C., and solidifying point 12° C. and 8° C. Both were soluble in 2.5 volumes of 90 per cent alcohol.

Heinrich Haensel (*Half-Yearly Report*, October, 1907, p. 5) points out that cordials and liquors flavored with anise oil remain bright even at a temperature of -9° C.

OLEUM AURANTII CORTICIS.

Brandel, I. W., presents the requirements for oil of sweet orange official in the U. S. P. VIII, and the Ph. Austr. VIII.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 123.

Schimmel & Co. (*Semi-Ann. Rep.*, April, 1907, pp. 51-52) discuss the production of sweet orange oil in Sicily and Calabria, and call attention to the lack of labor for producing the crops which has a tendency to reduce the production of the oil, and, at the same time, advance the price of this article.

Scoville, W. L., asserts that oil of orange varies considerably in quality and flavor in fresh samples.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 328.

Charabot and Laloue (*Bull. Soc. Chim.*, 8, 35, 913) report on the distribution of oil in the sweet orange tree and complete the series of observations already published on the formation and distribution of essential oils in the plant.—*Year Book of Pharmacy*, Lond., 1907, p. 117.

Hankey, William T., asserts that oils of lemon and orange are frequently washed with dilute alcohol in order to prepare the terpenless oils which are in great demand for soluble extracts, and the residue after washing mixed with fresh oil or sold as it is for prime oil.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 72.

OLEUM BETULÆ.

Mitchell, Edward, asserts that between oil of sweet birch and wintergreen artificial there is so little apparent difference that we buy the former from the farmers who distill the item in a small way, and we "watch the farmers."—*Proc. Arkansas Pharm. Ass.*, 1907, p. 90.

An editorial points out that the production of birch oil is a business of quite large proportion in some parts of Delaware. The business is carried on by small distillers with a capacity of from 3 to 10 pounds per day.—*Paint, Oil and Drug Rev.*, Chicago, 1907, v. 43, May 8, p. 29.

A news item points out that for the manufacture of "oil of winter-green" farmers are paid \$3.50 per ton for birch brush; one factory in Connecticut using over 1,500 tons annually.—*Pharm. Era*, N. Y., 1907, v. 37, p. 125.

OLEUM CADINUM.

Caspari, Chas. E., (com. on adulterations) examined 3 samples of oil of cade, all incompletely soluble in ether.—*Proc. Missouri Pharm. Ass.*, 1907, p. 147.

OLEUM CAJUPUTI.

Brandel, I. W., presents the official requirements included in the U. S. P. VIII, Ph. Austr. VIII, and Ph. Hisp. VII.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 147.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 19-20) assert that America still stands at the top as a consuming country for oil of cajuput; as already mentioned, the consumption of this article in Europe has suffered considerably from the good and cheap eucalyptus oils.

Baker and Smith (*Proc. of the Linnean Soc.*, of N. S. W., 40, 1906, 60) give a description of the two species of Australian melaleucas, *Melaleuca thymifolia* Sm. and *M. linariifolia* Sm. They give detailed information on the oils contained in these species.—Schimmel & Co. Semi-Ann. Rep., April, 1907, p. 14.

Schimmel & Co., (Semi-Ann. Rep., April, 1907, p. 108) in commenting on the proposed changes in the Ph. Brit., point out that the lower limit for the specific gravity of cajuput oil is too high, viz, 0.922; it should read specific gravity 0.919 to 0.930. They are convinced that the phosphoric-acid method, for the determination of cineol, does not give reliable results and for this reason can not recommend it as useful.

Hankey, William T., asserts that it has not been possible for him to secure a green-colored oil that will stand the U. S. P. test for copper. He has seen but one sample of green oil that was free from copper, but received an oil that contained the usual amount of copper. The demand of the trade seems to be for the green oil. Commercial oil also runs considerably below the required 55 per cent cineol, the lowest amount found being 30 per cent, and with one exception the highest was 47 per cent.—*Am. Druggist*, N. Y., 1907, v. 50, p. 8.

Gausby, R. A., asserts that nothing but the redistilled oil meets the requirements. Different lots examined assayed from 49 to 58 per

cent cineol. All showed presence of copper. It is possible, though difficult, to procure oil assaying 55 per cent or over of cineol.—Proc. Pennsylvania Pharm. Ass., 1907, p. 77.

Gane, E. H., reports one sample original bottle adulterated with kerosene and turpentine. Specific gravity 0.915 rotation $+0.5$ cineol 35 per cent, traces of copper.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 328.

Patch, E. L., examined 3 lots which contained copper. One lot of rectified free from copper.—*Ibid.*, v. 55, p. 328.

Caspari, Chas. E., (com. on adulterations) examined eight samples. All contained copper.—Proc. Missouri Pharm. Ass., 1907, p. 146.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 12) examined three samples of cajuput oil. Two gave a specific gravity of 0.920 and 0.919; optical rotation $-2^{\circ} 10'$, -2° and contained 51.2 and 45 per cent of cineol, respectively. One gave specific gravity of 0.917 and contained 52.1 per cent cineol.

Gilmour, J. P., reports 1 out of 8 samples which did not comply with Ph. Brit. requirements; Cu present.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

OLEUM CARI.

Brandel, I. W., calls attention to a study of oil of caraway and presents the official requirements for oil of caraway in the U. S. P. VIII, and for carvone in the Ph. Austr. VIII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 152.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, p. 108) point out that the rotation of the normal caraway oil lies between 70 and 80°. Also (*Ibid.*, October, 1907, p. 101) point out that the U. S. P. corrections up to June 1, 1907, provide that caraway oil should have a specific gravity of from 0.900 to 0.910.

OLEUM CARYOPHYLLI.

Brandel, I. W., reviews some of the literature relating to oil of cloves, and gives the official requirements included in U. S. P. VIII, and the Ph. Hisp. VII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 147.

Thurston, Azor, states that Lithgoe gives -3.1° V., in a 100 mm. tube, as the proper reading for oil of cloves, and that Leach's figures are -3.8° V., in 100 mm. tube.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Mossler, Gustav, discusses the bromine absorption property of oil of cloves and the possibility of utilizing this property as an indication of the eugenol content of the oil, also presents the results of a number of examinations in the form of a table.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 284.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, p. 119) discuss the determination of phenols, pointing out that they determine the eugenol in all oils containing this body, exclusively with 3 per cent soda liquor.

Hankey, William T., asserts that oil of cloves is frequently deficient in eugenol, possibly due to the demand made for eugenol in the manufacture of vanillin.—Proc. Pennsylvania Pharm. Ass., 1907, p. 72.

Graham, Willard, found one sample of oil of cloves to be below the U. S. P. VIII standard for specific gravity.—*Ibid.*, 1907, p. 238.

Baird, J. W., (com. on adulterations) reports on 13 samples; 11 genuine, 2 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 39.

Patch, E. L., reports an examination of 6 lots, with a specific gravity of from 1.0420 to 1.0461, and from 83 per cent to 87 per cent of eugenol. One lot had a specific gravity of 0.9199. It proved to be a very poor mixture of residues and was worthless.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 328.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 17) report that their distillates this year have consistently tested from 88 to 90 per cent of eugenol by the potash absorption method.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 37) report on a sample of oil of cloves originating from Seychelles, which resembles ordinary clove oil in the color and odor.

An editorial quotes Webster as asserting that oil of cloves, on account of its pronounced bactericidal action, constitutes an excellent disinfectant for the hands, for which it is distinctly preferable to mercuric dichloride.—Pacific Pharm., San Francisco, 1907, 1908, v. 1, p. 428.

OLEUM CHENOPODII.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) note that in the corrections of the U. S. P. up to June 1, 1907, requirements of specific gravity, rotation, and solubility have been canceled.

Nelson, Burt E., describes and figures the structural characteristics of chenopodium.—Merck's Report, N. Y., 1907, v. 16, p. 162.

Thurston, Azor, gives the angle of rotation of oil of chenopodium as not exceeding 5° in a 100 mm. tube at 25° C.—*Ibid.*, v. 16, p. 124.

Kremers, Edward, reports an experience with American wormseed oil, a sample of which, when an attempt was made to distill, decomposed with violence. As he points out, the oil is unique in its behavior, and is deserving of more careful study.—Parm. Rev., Milwaukee, 1907, v. 25, pp. 155-157.

Caspari, Chas. E., (com. on adulterations) examined 4 samples. All were low in specific gravity.—Proc. Missouri Pharm. Ass., 1907, p. 147.

Cuniasse, L., (Journ. Pharm. Chim., 25, 180) asserts that the presence of oil of wormseed in the proportion of 3:1,000 may be detected in alcoholic solutions by means of reactions, which are due to the occurrence of the ketone, thujone, in the oil.—Year Book of Pharmacy, Lond., 1907, p. 178.

Brüning, H., (D. Med. Wschr., 1907, No. 11) reports experiments on children which have confirmed previous conclusions that the oil of American wormseed (*Chenopodium anthelminticum*, L.) does not only deserve to rank side by side with santonin as its equal, but that disturbances which have always to be taken into account when santonin is administered never occur in a manner worth mentioning if wormseed oil is taken as an anthelmintic.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 322.

OLEUM CINNAMOMI.

Brandel, I. W., presents a review of the recent literature on oil of cinnamon, and gives the requirements for cinnamic aldehyde in the U. S. P. VIII and the Ph. Austr. VIII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 61.

Lushring and Thamm (Analyst, 31, 231, 6364; Untersuch. Nahr. Genusssm. 11, 129; 12, 113) examined samples of cassia bark containing ash from 2.36 to 2.37 per cent; water-soluble ash, 0.90 to 0.96 per cent; alkalinity of water-soluble ash, as above, 5.95 to 6.14; of insoluble ash, 28.6 to 29.4.—Year Book of Pharmacy, Lond., 1907, p. 150.

Mossler, Gustav, reports experiments on the bromine absorption property of oil of cinnamon, and presents a table giving the bromine number of various oils examined.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, pp. 300-301.

A special correspondent, writing from Hankow, China, asserts that the method used in the production of oil of cassia is not definitely known; as few Europeans ever go into these regions, it is difficult to learn much about the methods employed. They are believed to be very primitive, indeed.—Oil, Paint and Drug Reporter, New York, 1907, v. 71, June 24, p. 30.

Blome, Walter H., (com. on adulterations) reports samples of oil of cassia containing lead and copper.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Gausby, R. A., points out that it is impossible to procure an oil free from colophony, except the redistilled article. All samples examined contained from 75 to 85 per cent of cinnamic aldehyde, with one exception, which contained 74 per cent. All samples, except the redistilled article, contained traces of lead from the containers.—Proc. Pennsylvania Pharm. Ass., 1907, p. 77.

Baird, J. W., (com. on adulterations) reports 14 samples, 8 genuine, 6 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 39.

Hirschsohn reports oil of cassia regularly adulterated with resin. One volume pure dissolves clear in three volumes of 70 per cent alcohol. If 5 per cent of resin is present it is opalescent. One part of pure oil is slowly soluble in three parts of petroleum ether. Specific gravity 0.650. Resin, fatty oils and other essential oils separate out.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 328.

Gane, E. H., asserts that most of the imported oil of cassia contains traces of lead and some resin compounds.—*Ibid.*, v. 55, p. 328.

Patch, E. L., says that the common oil of cassia contains lead. Twice rectified is free from lead. Three lots examined had a specific gravity of from 1.0508 to 1.520 and all contained 90 per cent of cinnamic aldehyde.—*Ibid.*, v. 55, p. 328.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 15) examined two samples with specific gravity of 1.064 and 1.062; optical rotation -2° , $-1^{\circ} 30'$; aldehyde content 80 and 84 per cent. Both were soluble in two volumes in 70 per cent alcohol.

An abstract from *Therap. Monatsch.* points out that oil of cinnamon is suggested as a remedy for influenza given in a half glass of water. During the first two hours of treatment 12 drops of the oil is given twice, an hour intervening between the doses; afterwards, 10 drops every two hours until the temperature becomes normal.—Pharm. J. Lond., 1907, v. 25, p. 625.

OLEUM CINNAMOMI ZEYLONICUM.

Gausby, R. A., reports one lot of oil of Ceylon cinnamon suspiciously like oil of cassia. It assayed 90 per cent cinnamic aldehyde.—Proc. Pennsylvania Pharm. Ass., 1907, p. 76.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, pp. 16-17) found 3 abnormal samples and 2 questionable, ranging from 0.989 to 1.053 specific gravity and from $-1^{\circ} 0'$ to $4^{\circ} 30'$ optical rotation. One abnormal contained 62 per cent phenols and two 17.0 and 17.5 per cent phenols and 77 to 70 per cent aldehyde. Six normal samples examined ranged from 1.023 to 1.039 specific gravity, and from $-0^{\circ} 10'$ to $-1^{\circ} 8'$ optical rotation, 6 to 13 per cent phenols, and 72 to 84 per cent cinnamic aldehyde.

Heinrich Haensel (Half-Yearly Report, April, 1908, p. 9) describes a terpeneless oil of cinnamon having a golden yellow color, a specific gravity of 1.0325 at 15° C., an optical rotation of $-0.32'$ at 20° C. in a 100 mm. tube; one part by weight required for its complete solution only 1.8 parts by weight of 70 per cent alcohol.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, p. 28) give the results of the examination of the essential oil from the bark of the trunk of *Cinnamomum pedunculatum* Nees (*C. japonicum* S. et Z.) by Keimatsu and Asahina. The oil differed completely from the ordinary cinnamon oil: Specific gravity 0.917; optical rotation $280^{\circ} 54'$

($-4^{\circ} 40'$) ; acid number 0 ; saponification number 0 ; saponification number after acetylation 84.6. The oil was rich in phellandrene and contained also a small quantity of eugenol, and methyl eugenol which was identified by oxidation with veratric acid.

OLEUM COPAIBÆ.

Brandel, I. W., reviews some of the recent literature relating to oil of copaiba, its origin, and the detection of adulteration.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 64.

Schimmel & Co. (*Semi-Ann. Rep.*, October, 1907, p. 101) point out that the requirement of solubility of copaiba oil in the U. S. P. has been canceled.

Parry, Ernest J., points out that at times oil of copaiba with a rotation of -25° may be found, but that rarely oil may be found with a rotation of -9° . He asserts that with care the oil obtained by steam distillation and by direct distillation *in vacuo* should exhibit little differences in optical rotation.—*Chem. & Drug. Lond.*, 1907, v. 71, p. 518.

Weigel, G., takes exceptions to some of the statements made by Parry on the optical rotation of the essential oil of copaiba and reports a variation in optical rotation of from 5° to 28° .—*Ibid.*, v. 71, pp. 617-618.

An editorial points out that the Ph. Brit. requirement of rotation, -28° to -34° is admittedly an error in abstraction, and should be -14° to $-17^{\circ} 30'$. The U. S. P. merely requires the oil to be laevorotatory.—*Ibid.*, v. 70, p. 521.

OLEUM CORIANDRI.

Bernegau, Henry, reports on a sample of oil of coriander which complied with the U. S. P. requirements for specific gravity and solubility but had an optical rotation of -15.4 in place $+7^{\circ}$ to $+14^{\circ}$ required by the U. S. P.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 534.

Schimmel & Co. (*Semi-Ann. Rep.*, April, 1907, p. 108) assert that coriander oil is dextrorotatory, having an optical rotation of $+8^{\circ}$ to $+13^{\circ}$.

A correspondent asserts that pure coriander oil can be prepared without difficulty and that the product obtained by using orange oil as it is found now and then, even at the present time, must be considered as adulterated and if the foreign ingredient is not made known, its sale is a fraud.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 60.

OLEUM CUBEÆ.

Schimmel & Co., (*Semi-Ann. Rep.*, April, 1907, p. 108) in commenting on the proposed changes in the Ph. Brit., point out that the lower limit of optical rotation for cubeb oil should be fixed at -25° .

OLEUM ERIGERONTIS.

Brandel, I. W., calls attention to a study of oil of erigeron by Rabak, and gives the properties of two oils as recorded by him.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 185.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 101) point out that the corrections of the U. S. P. up to June 1, 1907, provide that oil of erigeron should have optical rotation not below $+45^\circ$ at 25° C. They state that in recent times they have had to deal with authentic erigeron oils which had a distinctly higher specific gravity than that allowed by the U. S. P. The oils in question amounted up to 0.887 at 15° C. corresponding to 0.881 at 25° C.

Hankey, William T., has failed to find a sample of erigeron oil that complied with all of the requirements of the U. S. P. He reports observations on a number of samples which were supposed to be of good quality, several coming direct from the Michigan distillers. Not having been able to secure what might be called an authentic sample, he is not prepared to say whether the requirements are too high or whether the variation is due to the admixture of weedy oils.—Am. Druggist, N. Y., 1907, v. 50, p. 8.

OLEUM EUCALYPTI.

Brandel, I. W., reviews some of the literature relating to oil of eucalyptus from various sources, and presents the official requirements of the U. S. P. VIII, and the Ph. Hisp. VII for oil of eucalyptus and for eucalyptol.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 148.

Mossler, Gustav, records experiments on the bromine absorption property of oil of eucalyptus, and presents a table giving the bromine number of eucalyptus oils and of eucalyptol.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, pp. 299–300.

Smith, H. G., (J. Pro. Roy. Soc., N. S. Wales, 39, 39–47) presents a list of the refractive indices with other data of the oils of 118 species of eucalyptus.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1893.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 53) call attention to the work of Maiden, who presents a study of eucalytus in which he describes various species in detail.

Baker, R. T., (Proc. Linnean Soc., of N. S. W., 1906, part II, 303) discusses the oils contained in *Eucalyptus carnea*, sp. nov. (Syn. *E. umbra* R. T. Baker, partim,) and *E. thozetiana* F. v. M.—Schimmel & Co. Semi-Ann. Rep., April, 1907, p. 52.

Bernegau, Henry, found the cineol content of oil of eucalyptus to be too low in most cases, some oils assaying only 10 to 15 per cent instead of 50 per cent.—Am. J. Pharm. Phila., 1907, v. 79, p. 554.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 22) report on the examination of 30 samples from various sources, 4 of which were of inferior quality.

Schimmel & Co. (Semi-Ann. Rep., Oct., 1907, 45-50) find that with the "phosphoric acid U. S. P. method," a really correct result is a matter of chance, and the method consequently unreliable and useless. With the aid of "hydrobromic acid" partly correct results were obtainable, but without being able to obviate in some cases quite considerable losses. They have now found that "resorcinol" is a more suitable substance for the quantitative separation of cineol from the oils, and describe the process for carrying out the determination.

Phillips, L. C., (Lancet) reports his experience with the use of eucalyptus oil in ankylostomiasis and asserts that this treatment is more successful than thymol is in such doses as can be given in safety. He gives it in doses of 2.50 gm. of eucalyptus oil, mixed with chloroform 3.50 gm. and castor oil 40 gm.—Drug Topics, N. Y., 1907, v. 22, p. 137.

Blumel (Beit. z. Klinik d. Tuberkulose, Würzburg, v. 8, No. 2) cites Berliner in regard to the treatment of tuberculosis with oil of eucalyptus, and states that transient benefit followed its use in a little more than half of his cases so treated. Pain at seat of injection, loss of appetite from disagreeable odor in breath, and occasional albuminaria were observed.—J. Am. M. Ass., 1907, v. 49, p. 1960.

OLEUM FENICULI.

Brandel, I. W., gives a structural formula, recommended by Semmler, for fenchone, and the official requirements for oil of fennel in the U. S. P. VIII, and the Ph. Austr. VIII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 152.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 103) point out that solidification must sometimes be started by inoculation with a small quantity of solid anethol, as under certain conditions fennel oil may be cooled much below its solidification point without actually solidifying.

Thurston, Azor, gives the angle of rotation of oil of fennel as being from $+7^{\circ}$ to $+20^{\circ}$.—Merck's Report, N. Y., 1907, v. 16, p. 124.

OLEUM GAULTHERIÆ.

An editorial asserts that much of the oil of wintergreen of commerce is made from black birch brush, and describes the method of manufacture in the region of Huntington and Chester, Mass.—Paint, Oil and Drug Rev., Chicago, 1907, v. 43, Jan. 9, p. 18.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, p. 102) point out that, owing to the new food and drugs act in the United States, the use of the natural oil has been taken up again more largely, whereas up to the present the artificial oil had been chiefly employed for flavoring.

Thurston, Azor, asserts that oil of gaultheria is slightly lævo-rotate up to -1° in 100 mm. tube at 25° C. Commercial samples examined were optically inactive. He quotes Leach as stating that oil of wintergreen is optically inactive.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Scoville, W. L., states that oil of wintergreen sold as leaf oil is optically inactive. It has a birch-like odor.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 329.

Gausby, R. A., reports the examination of one lot of oil of gaultheria containing a small quantity of petroleum oil, probably due to the oil having been placed in a dirty container, as this method of cheapening the product is no longer used. He points out that as admixture with synthetic oil is almost impossible to detect, a reliable source of supply at first hand is absolutely essential.—Proc. Pennsylvania Pharm. Ass., 1907, p. 77.

Patch, E. L., examined 3 lots varying in specific gravity from 1.179 to 1.1763 and from -0.4 to -0.5 optical rotation.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 329.

OLEUM GOSSYPII SEMINIS.

The resolutions adopted by the Interstate Cottonseed Crushers' Association point out that cotton-seed oil is the most valuable product made from cotton seed, and that it is now sold under well-defined rules and regulations satisfactory to the buyer and seller, and that no additional legislation is required to regulate its production or sale.—Oil, Paint and Drug Reporter, New York, 1907, v. 71, June 3, p. 28N.

Kuhn and Bengen (Z. Nahr. Genussm., 12, 145) review the work that has been done in connection with the "Halphen reaction" and show that the test is greatly affected by the method employed. By using a reflux condenser to prevent the loss of carbon bisulphide they found that the reaction was greatly retarded, which they explain on the ground that the proper temperature is not reached, as the reaction takes place best at from 100° to 105° . They regard the great difference in sensitiveness for this test as reported in the literature as due to the difference in methods employed.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 69.

Rupp, E., (Pharm. -chem. Inst., Marburg. Z. -Nahr. -Genussm. 13, 74-76) suggests that the Halphen reaction be determined in a pres-

sure flask, reports some experiments and adduces several reasons to corroborate his statement.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1067.

Petkow, Nikola, reviews the several tests for cotton-seed oil, and concludes that the active substances causing the Halphen and Bocchi reactions are not identical and are probably unsaturated fatty acids. These substances vary in quantity and proportion and the resulting reactions are therefore not uniformly intense.—Ztschr. f. öffentl. Chem., 1907, v. 13, pp. 21–25.

Wesson, David, discusses the value of cotton-seed oil in the manufacture of soap, and asserts that the best method of refining cotton-seed oil up to the present time consists in treating it with caustic soda, which is done in large tanks containing from 50 to 300 barrels.—J. Soc. Chem. Ind., Lond., 1907, v. 26, p. 595.

An unsigned article points out that crude cotton-seed oil is dark, reddish brown to black in color, and must be refined for most purposes. It is settled until a slimy precipitate has deposited, then agitated with caustic alkali solution, and again allowed to settle. The sediment or "foots" is used for soap stock. If the oil is clarified with fuller's earth, and chilled below 12° C., the palmitin and stearin crystallize, and are removed by cold pressing. This solid fat is called cotton-seed stearin, and is used in making oleomargarine.—Paint, Oil and Drug Rev., Chicago, 1907, v. 44, October 9, p. 33.

The report of the Interstate Cottonseed Crushers' Association records the rules adopted by that association to govern all trades in cotton seed and cotton-seed products; also a set of resolutions asking for state and federal legislation to control commerce in cotton seed and cotton-seed products.—Oil, Paint and Drug Reporter, New York, 1907, v. 71, June 3, pp. 28M, 28N.

OLEUM HEDEOMÆ.

Brandel, I. W., calls attention to some recent publications on oil of pennyroyal and the constants of the U. S. P. VIII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 181.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 68) report that the scarcity of oil of European pennyroyal has become somewhat less pronounced by the arrival of the new Spanish distillate. A few large parcels recently sold had to be rejected on account of defective quality.

Gausby, R. A., reports that pennyroyal oil is occasionally adulterated. One lot examined contained turpentine and one lot shipped as oil of pennyroyal U. S. P. proved to be French oil of pennyroyal.—Proc. Pennsylvania Pharm. Ass., 1907, p. 77.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 36) examined 3 French oils, which tested as follows: Two had a specific gravity of .928 and .939; optical rotation $+6^\circ$, $+9^\circ 30'$. Soluble in 3 volumes of 70 per cent alcohol. The other sample gave a specific gravity of .926; optical rotation, $0^\circ 20'$. The normal figures of 4 samples were: Specific gravity, from .930; optical rotation $+17^\circ$ to $+23^\circ$. Soluble in 3 volumes of 70 per cent alcohol.

Barrowcliff, Marmaduke, reports on the constituents of the essential oil of American pennyroyal.—J. Chem. Soc. Lond., 1907, v. 91, pp. 875-887.

OLEUM HYOSCYAMI COMPOSITUM N. F.

Beringer, George M., criticises the note under compound oil of hyoscyamus and objects to the inclusion of "*Balsamum Tranquillans*" as a synonym. He also objects to the substitution of a mixture of lard oil and cotton-seed oil in place of olive oil for the making of infused oil of hyoscyamus similar to that official in the Ph. Germ.—Am. J. Pharm., Phila., 1907, v. 79, p. 354. (See also Proc. New Jersey Pharm. Ass., 1907, p. 74.)

OLEUM JUNIPERI.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 101) note that in the corrections of the U. S. P. up to June 1, 1907, the requirement of solubility is omitted.

Thurston, Azor, gives the angle of rotation of oil of juniper as being $+0^\circ$ to -18° . A commercial sample examined by him gave -1.5° V. in a 100 mm. tube.—Merck's Report, N. Y., 1907, v. 16, p. 124.

An editorial discusses the question of what is oil of juniper and points out that the Ph. Brit. is the most inadequate guide for the purity examination of this oil.—Pharm. J. Lond., 1907, v. 25, pp. 65-66.

Bird, F. C. J., reports observations on oil of juniper and asserts that the present Ph. Brit. monograph on *oleum juniperi* certainly requires to be made more definite. He suggests as a possible explanation of the differences observed between English and foreign oil of juniper, that the English oil consists of the entire distillate from the juniper berries, whereas the imported oil may be the lighter portion of the oil separated by redistillation.—*Ibid.*, v. 25, pp. 130, 131.

Umney, John C., thinks that there is considerable doubt as to whether the medicinal properties of juniper are due to pinene or cadinene, and asserts that if the medical council would indicate what they wanted the pharmacists would at once proceed to frame a series of tests to meet their requirements.—*Ibid.*, v. 25, p. 150.

Umney and Bennett discuss the question "What is oil of juniper?" and outline limitation tests for oils of good quality.—*Ibid.*, v. 25, p. 131.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, pp. 27, 28, 29) again call attention to the great discrepancy existing between the entire distillates produced by themselves and much of the so-called genuine "rectified" berry oil of continental origin.

Brewis, E. T., asserts that foreign oil of juniper is a by-product rather than a normal distillate of juniper berries. Some of the foreign oils have a much lower specific gravity; samples submitted to him were as low as 0.859 and even 0.858.—*Pharm. J. Lond.*, 1907, v. 25, p. 149.

Rodié, J., (*Rev. gén. Chim.*, 1906, v. 9, p. 444) discusses the several kinds of oil of juniper and classifies them according to their derivation.—*Chem. Repert.*, Cöthen, 1907, v. 31, p. 326.

OLEUM LAVENDULÆ FLORUM.

Brandel, I. W., calls attention to the change in physical constants produced by several adulterants for oil of lavender, and gives official requirements of the U. S. P. VIII, Ph. Austr. VIII, and the Ph. Hisp. VII.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 154.

Schimmel & Co. (*Semi-Ann. Rep.*, October, 1907, p. 101) note that the U. S. P. corrections up to June 1, 1907, require that lavender oil have a specific gravity of from 0.875 to 0.910 at 25° C.

They (*Ibid.*, April, 1907, 62) also present the results of comparative experiments conducted at Barreme with dry steam and high water distillation which prove conclusively that a higher yield of oil with a richer percentage of esters is obtained in a shorter time by the former method than by the old-fashioned and generally followed process of distillation. It is further found that fresh flowers give a better result than those which have been partially dried.—*Year Book of Pharmacy*, Lond., 1907, p. 90.

Gausby, R. A., asserts that a fairly good oil should assay not less than 30 per cent of ester. Several lots examined ran considerably below this figure, although no fraudulent additions were found.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 77.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 30) detected only one case of flagrant adulteration. The oil in question tested 0.883 of specific gravity; optical rotation $-18^{\circ} 8'$ and was not soluble in 70 per cent alcohol. A large proportion of fixed oil was present. Normal samples tested 0.919 to 0.916 specific gravity and $-0^{\circ} 20'$ to $+6^{\circ} 20'$ optical rotation. Ester (as linalyl acetate) 2 to 5 per cent, soluble in from 2 to 3 volumes of 70 per cent alcohol. They also examined French "Petalæ," which tested a specific gravity of

from 0.891 to 0.903 and from $-4^{\circ} 12'$ to $-8^{\circ} 18'$ optical rotation. Ester (as linalyl acetate) 28 to 41.3 per cent, soluble in 3 volumes of 70 per cent alcohol.

OLEUM LIMONIS.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) note that the corrections of the U. S. P. up to June 1, 1907, require that lemon oil have an optical rotation not below $+58^{\circ}$ at 25° C.

Brandel, I. W., reviews the literature of 1905 relating to oil of lemon and gives the requirements included in the U. S. P. VIII, Ph. Austr. VIII, and the Ph. Hisp. VII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 122.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 103) note that the new Ph. Dan. requires that lemon oil be a light yellow; specific gravity 0.858 to 0.861 at 15° C.; with 5 volumes alcohol it forms a not quite clear solution; must not show a strong acid reaction. They add that it would have been better to have given 0.857 as lower limit of value.

Barrett, Arthur A., in a letter to an English publication, describes the method of making lemon oil as in vogue in Messina, Italy.—Paint, Oil and Drug Rev., Chicago, v. 43, March 6, p. 12.

Thurston, Azor, discusses the application of the polariscope to the examination of spirit of lemon and describes the optical rotation of this preparation.—Merck's Report, N. Y., 1907, v. 16, p. 125.

Berté and Romeo point out that oil of lemon has chemical and physical characters which are changeable. They assert that the limitations of the U. S. P. are so inconsistent with the facts as to be an obstacle to the local trade as well as to business in the U. S. A. The American customs authorities, on the basis of the Pharmacopœia, refuse to admit absolutely pure oil of lemon. They discuss the U. S. P. methods of analysis and point out that the methods given can not give satisfactory results.—Chem. & Drug., Lond., 1907, v. 71, p. 772.

Gane, E. H., refers to the difficulty of obtaining oil of lemon that will stand the U. S. P. requirements for citral, while answering all others, and points out that it has been stated that the official descriptions are based on commercial products.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 320.

A manufacturer of oil of lemon complains that upon inquiry he was told that the U. S. P. was the standard for oil of lemon; that the standard was contained in circular No. 19, and that a paper headed "Corrections of the U. S. P., May 1, 1907," was the real standard.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, December 30, p. 8.

An editorial points out that the United States market for lemon oil has been greatly perturbed of late, owing to the fact that several large parcels of pure oil from Sicily have been rejected by the customs authorities, while others have been detained pending investigation. The Messina Chamber of Commerce has taken up the matter, and dispatched Dr. Giuseppe Bosurgi, an Italian expert, to New York.—*Chem. & Drug.*, Lond., 1907, v. 71, p. 756.

A news note asserts that the experts of the Bureau of Chemistry admit that the lemon-oil importations are subject to more severe tests than formerly. They assert that the severity of these facts is not to be relaxed.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 72, November 11, p. 28F.

Schimmel & Co. (*Semi-Ann. Rep.*, April, 1907, 50) point out that the lemon oil produced during the recent season has had an abnormally high citral content, with a low specific gravity, and a very low optical rotation. The specific rotation of the present season's oil is so low that the requirements of the U. S. P., the lowest limit of which is $+60^\circ$ at 25° C., can hardly be met, and will not be attained as the crop progresses. All of this year's oils have a very poor solubility, with a high citral content at the commencement of the season, which occasioned much trouble; as the fruit ripened, however, the solubility improved.

An editorial points out that because of the enforcement of the pure food and drugs law shipment after shipment of oil of lemon has recently been rejected by the government authorities. In some cases as high as 20 per cent of adulteration has been detected.—*Meyer Bros. Drug.*, St. Louis, 1907, v. 28, p. 505.

Hankey, William T., asserts that he has been able to secure this oil of a quality that is above reproach, but has been unable to do anything toward the estimation of citral when using the formerly prescribed indicator, viz, phenolphthalein.—*Am. Druggist*, N. Y., 1907, v. 50, p. 8.

Stallman, A. C., points out that two shipments of oil of lemon have been rejected, one being adulterated most grossly with turpentine and the other being adulterated with alcohol.—*Proc. N. W. D. A.*, 1907, 33rd Ann. Meet., p. 155.

Bachman, Gustav (com. on adulterations), reports oil of lemon ranging from 3.2 per cent to 1.64 per cent of citral in place of 4 per cent required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 41.

Baird, J. W., (com. on adulterations), reports on 18 samples, 9 genuine, 9 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

Scoville, W. L., points out that it is very difficult to obtain oil with 4 per cent of citral by U. S. P. assay. Samples tested as low as 1.8 per cent citral; a guaranteed product was only 2.2 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 328.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 31) report 2 samples, out of the 25 examined, as not genuine. In both cases the optical rotation fell below $+40^\circ$, and the specific gravity above 0.860. They have not, as yet, been able to use satisfactorily the citral estimation methods of the U. S. P. and N. S. D. In their opinion the most satisfactory procedure is the neutral sulphite method of H. E. Burgess (Analyst, 1904, p. 78). The proportion of aldehyde present in the terpeneless lemon oils of different makers varies greatly. By the above method they have found as little as 46 per cent, as much as 62 per cent (by volume), absorbed by sodium sulphite, whilst the specific gravity is usually between 0.894 and 0.898 and rotation between -7° and -8° .

Parry and Bennett (Chem. and Drugg., 69, 481) examined a small sample of essential oil distilled in the south of Spain and sent over to this country under the name of thyme lemon.—Year Book of Pharmacy, Lond., 1907, p. 161.

OLEUM LINI.

Ura, K., reports that a number of experiments with authentic samples of linseed oil would indicate that the iodine number is quite uniformly above 170, and suggests that the Ph. Japon III requirement (not less than 150) can safely be increased.—J. Pharm. Soc. Japan, 1907, pp. 995–1014.

Thurston, Azor, asserts that oil of linseed is slightly laevorotatory and that strong deviation of the polarized light to the right would indicate the presence of rosin oil. He quotes Bishop as stating that sesame oil may be suspected in case the polarization is to the right.—Merck's Report, N. Y. 1907, v. 16, p. 124.

Frey, Henry C., contributes a brief note on the qualitative detection of sulphur dioxide in linseed oil, by means of starch iodate paper.—J. Am. Chem. Soc., 1907, v. 29, p. 1372.

OLEUM MENTHÆ PIPERITÆ.

Brandel, I. W., calls attention to some recent literature relating to oil of peppermint, and gives the official requirements of the U. S. P. VIII, Ph. Austr. VIII, and the Ph. Hisp. VII.—Pharm. Rev., Milwaukee, 1907, v. 25, pp. 182–183.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) note that the corrections of the U. S. P. up to June 1, 1907, require that oil of peppermint have an optical rotation of from -20° to -33° at 25° C.; ester content (menthyl-acetate) at least 6 per cent.

They also point out (*Ibid.*, October, 1907, p. 103) that the new Ph. Dan. contains the following requirements for oil of peppermint: Colorless, yellowish, or greenish-yellow; specific gravity from 0.900 to 0.920 at 15° C.; at 20° C. soluble in 3 to 5 volumes dilute

alcohol; when more solvent is added, at most a slight cloudiness may occur.

Thurston, Azor, asserts that a sample of oil of peppermint examined by him gave an angle of rotation of -24.1° . He quotes several authors, who give widely varying degrees of optical rotation.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Mossler, Gustav, discusses the bromine absorption qualities of peppermint oil and presents in the form of a table the results of experiments on the bromine number, the menthol content, and the computed bromine number of the menthol free constituents.—Ztschr. d. allg. österr. Apoth. Ver., Wien, 1907, v. 45, pp. 283–284.

A news note discusses the cultivation of peppermint plant in America, the production of the oil, and the method of marketing it.—Pharm. J. Lond., 1907, v. 24, p. 347.

Babbitt, E. G., American vice-consul at Yokohama, reports that the peppermint plant used in the production of oil of peppermint is principally grown in Hokkaido, Yamagataken, Okayamaken, and Shiroshinoken, and gives additional information in regard to the production of oil of peppermint and menthol and the amount of oil exported from Yokohama and other Japanese ports to various countries.—*Ibid.*, v. 24, p. 204.

A review of the peppermint-oil industry of Japan gives the amount, value, and destination of the oil of peppermint exported from Japan during the years 1902–1906, inclusive.—Chem. Ind., Berl., 1907, v. 30, p. 402.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, pp. 81–82) present tables giving the production of peppermint in Japan in 1906. Tables are also given showing the shipments of the oil from Japan from 1902 to 1906, inclusive, and the export of peppermint oil and methol from Japan in each month of 1906.

An editorial points out that the Japanese oil of peppermint is obtained from a different species of mint than that which produces the true oil of peppermint and is an inferior oil having an unpleasant odor and bitter taste, but it is a heavy oil, containing a higher percentage of menthol, and, being a very much cheaper oil, it is liable to be used as an adulterant of the true peppermint oil.—Oil, Paint, and Drug Reporter, N. Y., 1907, v. 71, Feb. 4, p. 28D.

Gehe & Co. (Handels-Bericht, 1907, pp. 39–40) discuss the production of oil of peppermint and point out that there is a material reduction in the amount of peppermint grown in all of the producing countries, the production in the United States being at least 25 per cent lower than in previous years.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 69–71) report on the condition of the peppermint crops in the United States, England, Japan, and France.

Gawalowski, A. (Pharm. Post, 39, 786, 1906), gives an account of the color and other changes produced by the addition of sulphuric acid (with or without alcohol) to samples of peppermint oils. Also the action of certain oils toward chloral hydrate.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1164.

Hankey, W. T., has found the solubility in 17 per cent of alcohol of good Michigan oil to range from 1 in $2\frac{1}{2}$ parts to 1 in $3\frac{1}{2}$ parts, the majority being 1 in 3 parts. Less soluble oils have a marked weedy odor and are not desirable. He also reports on a number of observations made on different samples of peppermint.—Am. Druggist, N. Y., 1907, v. 50, p. 8.

Gausby, R. A., reports that only 1 lot of the samples examined contained the requisite percentage of menthol in the form of ester. This assayed 8.09 per cent of menthol acetate. The total menthol content of each of the oils ranged well over the required standard.—Proc. Pennsylvania Pharm. Ass., 1907, p. 77.

Blome, Walter H. (com. on adulterations), reports that oil of peppermint conforms to official requirements.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Scoville, W. L., points out that many commercial brands not redistilled have a coarse flavor.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 328–329.

Patch, E. L., examined 4 lots varying from 7.61 per cent to 9.27 per cent of menthyl acetate and from 52.73 per cent to 57.66 per cent of total menthol. Specific gravity 0.900 to 0.9045. Rotation -21.5° .—*Ibid.*, v. 55, pp. 328–329.

Elborne and Warren report observations on a number of samples of English oil of peppermint which, as they point out, while not exactly deviating from the official requirements, can be made to comply only by following particular methods of manipulation. The behavior of the several samples toward the official requirements are presented in the form of a table.—Pharm. J. Lond., 1907, v. 25, p. 359.

Parry, E. J., points out that many peppermint oils come on the market which are offered as "English distilled peppermint oil," but which are nothing but American peppermint oil rectified in England and to which at the utmost a small quantity of English oil has been added.—Chem. & Drug., Lond., 1907, v. 70, p. 100.

Lythgoe, Hermann C., reports 5 samples of spirit of peppermint out of the total of 8 examined as being adulterated.—Rep. Massachusetts Bd. Health, 1907, 1908, p. 384.

Thurston, Azor, asserts that spirit of peppermint should polarize -15.9° V. in a 200 mm. tube at 25° C.—Merck's Report, N. Y., 1907, v. 16, p. 124.

OLEUM MENTHÆ VIRIDIS.

Henderson, H. John, reports the characteristics of two samples of English oil of spearmint. The oil distilled in 1906 had a specific gravity of 0.931 and was soluble in its own volume of 90 per cent alcohol. The angle of rotation in 100 mm. tube was -50° at temperature of room 21.5° C. The oil distilled in 1907 had a specific gravity of 0.927 and was soluble in its own volume of 90 per cent alcohol. The angle of rotation in a 100 mm. tube was -50° at temperature of room 20° C.—Pharm. J. Lond., 1907, v. 25, p. 506.

OLEUM MORRHUÆ.

Koch, Felix J., presents a story of the cod-liver oil and records some impressions he obtained in a visit to Newfoundland.—Merck's Report, N. Y., 1907, pp. 340-341.

An editorial calls attention to the cod-liver prospects, and asserts that up to March 4 the total yield of 3,903 barrels of Norwegian cod-liver oil has been poor compared with 12,172 barrels in 1906.—Pharm. J. Lond., 1907, v. 24, p. 322.

Gehe & Co. (Handels-Bericht, 1907, pp. 38-39) discuss the production of cod-liver oil and give the production for 1906 from all Norwegian fisheries as being approximately 42,908 hectoliters, against 41,807 during the year 1905.

An editorial discusses the economic conditions relating to the cod fisheries and cod-liver oil, and gives figures showing the amount of oil produced from 1900 to 1907, inclusive.—Chem. & Drug. Lond., 1907, v. 70, p. 448.

Bousfield, W., reviews the economic conditions prevailing with Norwegian cod-liver oil and presents a table showing the total amounts of medicinal cod-liver oil made in the Lofoten Islands for the past twenty-one years.—*Ibid.*, v. 70, pp. 206-207.

Halphen, G., discusses the method for the analysis of fish oils described by Procter and Bennett, and points out several faults.—Bull. de la Soc. de chim. de France, Par., 1907, v. 1, p. 280.

Henseval and Huwart (from d. Ap. Ztg.) report a number of experiments with fish liver oils and present a table in which they record the color, acid number, saponification number, iodine number, ether number, and the amount of unsaponifiable residue. They also call attention to some of the more characteristic properties of these several oils.—D. A. Apoth. Ztg. N. Y., 1907, v. 28, p. 89.

An editorial acknowledges the receipt of a specimen of dugong oil, which is said to be used as a substitute for cod-liver oil in Queensland, having a more agreeable taste and being quite equal to cod-liver oil in nutritive properties.—Lancet, Lond., 1907, v. 173, p. 1101.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, pp. 17-18) report 40 specimens of cod-liver oil submitted for examination, 7 of which have been adversely reported upon. Two of these possessed a poor odor, so they merely took the refractive figures for the sake of curiosity. These were +86 and +34.5, showing seal oil to be the probable adulterant. They also received samples, assured to be genuine, having specific gravities from 0.930 to 0.932 and refractive figures from +49 to +51.

Baird, J. W. (com. on adulterations), reports on 10 samples, 9 genuine, 1 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 40.

Caspari, Chas. E., (com. on adulterations) examined 15 samples, 12 satisfactory, 3 contained other fish oils.—Proc. Missouri Pharm. Ass., 1907, p. 144.

An abstract (from Bull. Comm., 1907, 35, 428) gives the following formula for a palatable cod-liver oil preparation: Cod-liver oil, 120; malt extract, 30; syrup of calcium hydrophosphite, 30; powdered gum acacia, 15; glycerin, 15; cinnamon water, *q. s.* to make 250 by weight.—Pharm. J. Lond., 1907, v. 25, p. 675.

An editorial points out that the medicinal value of cod-liver oils was known centuries ago among the inhabitants of northern Europe. Medicinal cod-liver oil is prepared chiefly on the coast of Norway, and to a limited extent in Newfoundland, United States, and Japan. The preference given to the Norwegian oil is due to the favorable conditions under which the cod fisheries are there prosecuted.—Pacific Pharm., San Francisco, 1907-1908, v. 1, p. 426.

Jamieson, W. Allan, states that cod-liver oil is the only internal agent which is of any assistance in the treatment of ichthyosis. Pilocarpine is useless.—Brit. M. J., 1907, v. 1, p. 364.

Leonard, H. C., asserts that cod-liver oil should be used as an inunction if used at all, as it will do more harm than good when given by the stomach, because it interferes with the digestion and the appetite.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 504.

OLEUM MYRISTICÆ.

Brandel, I. W., quotes the official requirements for oil of mace of the U. S. P. VIII, and Ph. Austr. VIII.—Pharm. Rev. Milwaukee, 1907, v. 25, p. 59.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, 102) point out that the corrections of the U. S. P. up to June 1, 1907, require that oil of nutmeg have a specific gravity of from 0.884 to 0.924 at 25° C., and that the requirement of rotation has been left out.

Hoogenboom, F., (Pharm. Weekblad.; through Pharm. Journ., 1906, v. 77, p. 517) discusses the Ph. Ndl. requirements for oil of nutmeg and asserts that they appear to be inaccurate. He finds that about one-half of pure oil of nutmeg distills at 164° to 175° C., about

one-fourth between 179° and 198° C., and the remainder at a temperature rising to 235° C.—Analyst, London, 1907, v. 32, p. 28.

Power and Salway report upon the constituents of the essential oil of nutmeg.—J. Chem. Soc., Lond., 1907, v. 91, pp. 2037–2058.

Richter, Oscar, discusses the constitution and derivatives of myristicin, a constituent of oil of mace.—Ber. d. pharm. Gesellsch. Berl., 1907, v. 17, pp. 152–161.

OLEUM OLIVÆ.

Butman, Arthur B., discusses the cultivation of the olive and the production of oil.—Brit. & Col. Drug., Lond., 1907, v. 52, p. 240.

An editorial discusses the pamphlet published by the Los Angeles Olive Growers' Association, which discusses the adulteration of olive oil and asserts that in Europe cotton-seed oil is largely mixed with the olives as they are being crushed.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, November 4, p. 7.

Gehe & Co. (Handels-Bericht, 1907, pp. 40–41) point out that the olive oil produced in 1906 will be materially less in quantity than the oil produced the previous year. They point out that this, owing to the unusually large crop of olives in Italy, was to have been expected.

H. M., consul at Genoa, reports that the annual production of Italian olive oil shows great fluctuations, owing partly to the alternation of full and meager years' crops and partly to the ravages of the oil fly. The production during the five years, 1901–2 to 1905–6, is estimated as follows: 1901–2, 3,200,000 hectoliters; 1902–3, 1,800,000 hl.; 1903–4, 3,200,000 hl.; 1904–5, 1,700,000 hl.; and 1905–6, 3,400,000 hl. The most prized qualities are those produced in Tuscany (Lucca, Pisa), the Ligurian Riviera, and the Pugli (Bari, Bitonto, Gallipoli).—Chem. & Drug., Lond., 1907, v. 71, p. 702.

Consul D. I. Murphy, writing from Bordeaux, reviews the olive trade of the Mediterranean countries, as well as cultural methods employed in olive groves.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, December 2, p. 28D.

Consul-General B. H. Ridgely, of Barcelona, reports that owing to the abnormally high prices at which olive oil is being sold this year it has been found that some dealers have resorted to the practice of adulterating olive oil with linseed or sesame oil.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, July 15, p. 22.

A news note points out that the sale of olive oil constitutes a large item of revenue to California. At the present time it is estimated that a large part of the oil used in the United States is produced in California.—*Ibid.*, v. 71, June 3, p. 41.

A report from Consul E. L. Harris, at Smyrna, includes a table giving the production of olive oil in Smyrna during the past ten

years. The production in 1906 was 15,000 tons. Four thousand five hundred tons were used for comestible purposes and the production of soap, the remainder being exported to England, Russia, the United States, and Sweden.—*Ibid.*, v. 72, September 30, p. 10.

An unsigned article discussing the adulteration of olive oil in Spain says that the adulteration of oil is a generally accepted fact. "The oleaginous plants used by merchants to obtain greater gain are very numerous. They mix the poppy, colewort, or wild cabbage, benne seed, peanut and cotton-seed oils with the light, clear, and transparent oil of the olive.—*Ibid.*, v. 71, Jan. 28, p. 28D.

Pollatschek, P. (Rev. Fett-Harz-Ind., 14, 4-5), reports his investigation on several samples of olive oil which came from the island of Mallorca.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1065.

An unsigned article outlines the method of purifying olive oil in Tunis.—Nat. Druggist, St. Louis, 1907, v. 37, p. 133.

Archbutt, L., presents some observations on Tunisian and Algerian olive oils. Some of the samples of oil gave abnormal analytical results, the most noticeable being the presence of arachidic and lignoceric acids, somewhat low saponification values, and unusually large percentages of unsaponifiable matter. He gives the results of analysis of 9 samples in the form of a table.—J. Soc. Chem. Ind., Lond., 1907, v. 26, p. 453, 455.

Marcille, R., presents a note on the iodine index of olive oils and the variations of the index in Tunisian oils.—Ann. de chim. analyt. Par., 1907, v. 12, pp. 188-191.

Ryan and Marshall discuss the influence of oxygen and of nitrogen and sunlight and darkness on olive oil as affecting the iodine and saponification numbers and the production of rancidity. They conclude that the influence of oxygen is to decrease the iodine number and at the same time to increase the saponification number. It causes the oil to become rancid and lose its color. Under the influence no change is caused in the iodine number, but in the sterilized oil there is an increase in the saponification number.—Am. J. Pharm., Phila., 1907, v. 79, pp. 308-315.

Droste reports experiments to determine the reliability of the distinguishing tests for olive oil, and the readiness with which olive oil was affected by light and other factors. His results with light and mould confirm the generally accepted statements. Oxygen and moderate heat he believes have but slight influence on pure olive oil. He calls particular attention to the variability of the iodine solutions used for determining the iodine number and the great variability of the resulting color produced by alcoholic furfural and hydrochloric acid.—Apoth. Ztg., Berl., 1907, v. 22, pp. 589-590, 598-600.

Thurston, Azor, asserts that olive oil is slightly dextrogyrate.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Passerini, N., (Stez. Sper. Agric. Ital.; J. Pharm. Chim.) has found 0.0005 per cent of Cu in olive oil derived from trees which had not been treated with any copper insecticide. This amount of the metal is considered to be a normal constituent of the oil.—Year Book of Pharmacy, Lond., 1907, p. 116.

Bachman, Gustav, (com. on adulterations) reports olive oil ranging from 83.9 per cent to 72.7 per cent of iodine value in place of 80 to 88 as directed in the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Gausby, R. A., reports one sample of olive oil containing cotton-seed oil.—Proc. Pennsylvania Pharm. Ass., 1907, p. 78.

Hankey, William T., asserts that olive oil is frequently found containing cotton-seed oil; peanut oil is sometimes found in the better grades.—*Ibid.*, 1907, p. 72.

The Mass. Board of Health found 8 samples deficient: One contained 80 per cent sesame oil, one 40 per cent sesame oil, one 40 per cent cotton-seed oil, one all cotton-seed oil.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 328.

Caspari, Chas. E., (com. on adulterations) examined 15 samples, 13 satisfactory; 2 contained sesame oil.—Proc. Missouri Pharm. Ass., 1907, p. 144.

Baird, J. W., (com. on adulterations) reports on 35 samples, 30 genuine, 5 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 40.

Lythgoe, Hermann C., reports but one poor sample of olive oil out of 120 samples collected and examined during the year. The one adulterated sample contained 80 per cent of cotton-seed oil. He gives the ratio of adulteration from 0.87 in 1907 to 31 per cent in 1903.—Rep. Massachusetts Bd. Health, 1907, 1908, p. 381.

Gilmour, J. P., found a sample of olive oil probably adulterated with cotton-seed oil. The oil was said to be of Levantine origin.—Pharm. J. Lond., 1907, v. 25, p. 110.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 34) report four samples, offered as genuine, but which were obviously sophisticated, assaying a specific gravity from 0.9125 to 0.920; refractive figure from +2 to +12; free acid from 3.2 to 11.9. Two contained cotton-seed oil and two gave an iodine value of 71.6 and 85.4, and one a saponification value of 158.1. Three samples of green olive oil gave 18.63, 16, and 27 per cent free oleic acid, respectively.

OLEUM PIMENTÆ.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) note that the corrections of the U. S. P. up to June 1, 1907, require that pimenta oil have a specific gravity of from 1.028 to 1.048 at 25° C.

OLEUM RICINI.

Ebert, Felix, calls attention to the work that has been done on *Ricinus communis*, L., and gives a table showing the variations in size and color of seeds of different origin and the uses of the drug in China.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 541.

Haller, A., finds that by heating castor oil with methyl alcohol he can isolate and characterize, in the form of ether salts of saturated alcohols, the several acids entering into the constitution of this oil.—Compt. rend., Acad. d. sc., Par., 1907, v. 144, pp. 462-466.

Lane, N. J., (J. Soc. Chem. Ind., 26, 597) describes a method for the determination of castor oil in mixtures.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2398.

Bachman, Gustav, (com. on adulterations) reports castor oil ranging from an iodine value of 80.2 per cent to 67.8 per cent in place of 86 to 89 per cent required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Baird, J. W., (com. on adulterations) reports on 18 samples, 17 genuine, 1 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 40.

The inspectors of pharmacies found much castor oil that had been expressed with heat.—Ann. de pharm., Louvain, 1907, v. 13, p. 278.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 15) examined 10 samples of English grade (first pressure) which contained from 0.4 to 0.49 per cent of free oleic acid; 5 English second pressure from 10 to 14 per cent; 50 Calcutta (good seconds) from 0.6 to 2.1 per cent; 3 Italian (Pharmacy) from 0.5 to 0.6 per cent; 3 French (Pharmacy) from 0.4 to 0.5 per cent of free oleic acid. Two samples were mixtures of castor and mineral oils and a third called "compound," apparently contained lard oil.

Bourdier, L., experimenting with emulsions of castor oil concludes that gum tragacanth, lime water, casein, and medicinal soap permit the rapid obtaining of an emulsion. The preparations made with gum tragacanth or soap are, moreover, capable of preservation. Gum tragacanth permits the obtaining of a concentration of 1 to 3 and soap a concentration of 80 per cent.—J. de pharm. et de chim. Par., 1907, v. 26, pp. 201-205.

Wilbert, M. I., presents a formula for a 50 per cent emulsion of castor oil, using soap as the emulsifier and spirit of peppermint as the flavoring.—Am. J. Pharm., Phila., 1907, v. 79, p. 524.

Winternitz (Pharm. Zeit., 1907, 52, 363) gives the following method for the preparation of dried castor oil; the casein from 1 liter of skimmed milk is pressed until it contains not more than 70 per cent of water. To this 5 mls of caustic soda solution (10 per cent) is added, together with 40 gm. of lactose and 80 gm. of castor oil. The

brown mixture is then dried *in vacuo*.—Pharm. J. Lond., 1907, v. 25, p. 74.

A method of converting castor oil into a dry powder has recently been perfected by Wasserzug, of Frankfort. An emulsion of the oil is made with gum arabic and to this is added an equal quantity of magnesia. The water is then evaporated and the resulting hard mass ground up into a fine powder or the magnesia mixed with water, the oil added and the mixture then evaporated. A fine powder is obtained by these proceedings which is not fatty and possesses all of the oil itself. (Notes on New Remedies.)—Pharm. Era., N. Y., 1907, v. 37, p. 470.

Hommell, P. E., thinks that a formula for a tasteless and transparent castor oil preparation should be included in the U. S. P.—Proc. New Jersey Pharm. Ass., 1907, p. 63.

The editor of the "Therapeutics" column discusses available forms of castor oil. He thinks that the capsules are too large for children to swallow, and states that it may be administered by floating it on coffee, and in other ways.—J. Am. M. Ass., 1907, v. 49, p. 1617.

OLEUM ROSÆ.

Brandel, I. W., points out that oil of rose was discovered by the Arabs, and gives the official requirements of the U. S. P. VIII, and the Ph. Austr. VIII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 63.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, 78-80) review several communications concerning the cultivation of roses and experiments made on the extraction of oil, which have appeared in recent numbers of "La Vie à la Campagne" (1907, 414) and "La Revue de Grasse" (1907, Nos. 13, 16, and 17).—Proc. Am. Pharm. Ass., 1908, v. 56, p. 337.

An article (Chem. and Drug., 70, 1907, 815) asserts that the inhabitants of Eastern Trans-Caucasus have commenced the cultivation of a semi-double strongly smelling rose of Persian origin. The cultivation of the rose in various districts of the Trans-Caucasus is mentioned.

Gehe & Co. (Handels-Bericht, 1907, p. 41) discuss the available reports from the rose-oil districts of Bulgaria which were unusually favorable. They point out that there is a steady increase in the area of the rose plantations in Bulgaria.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 78) report that the development of rose bushes in Bulgaria was retarded by the cold weather and point out the natural increase of price due to the shortage of the crop.

An editorial discusses the economic condition prevailing in Bulgaria and the prospective rose crop which it is feared has been

damaged by the severe weather that has been experienced.—Pharm. J., Lond., 1907, v. 24, p. 619.

Parry, Ernest J., asserts that otto of rose is being very heavily adulterated this season. He asserts that some skilled chemist has prepared a geraniol mixture having a specific gravity of 0.875 and a refractive index of under 1.4700, and this mixture is now being used as an adulterant for oil of rose.—Chem. & Drug., Lond., 1907, v. 71, p. 475.

Gane, E. H., quotes E. J. Parry as asserting that all of the oil of rose exported contains an admixture of geraniol. Fifteen samples guaranteed as pure were all sophisticated.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 320.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, pp. 39, 40) give the tabulated figures of 7 lots of Bulgarian otto guaranteed by the makers to be absolutely genuine, and summarize as follows: Specific gravity, 0.8535 to 0.8578 (30° C.); optical rotation, $-2^{\circ} 20'$ to -4° ; refractive index, 1.46 to 1.4644. Of 8 samples submitted adulteration was probable in 3.

Schimmel & Co. (Semi-Ann. Rep., April, 1907, pp. 86-89) call attention to the fact that more rose oil was exported from Bulgaria in 1898, 1899, and 1903 than was produced—clear proof of adulteration. Tables are given showing the production in the various districts of Bulgaria in 1898, 1899, 1903, and 1904, also tables showing the export to the various countries from 1890 to 1905, inclusive.

OLEUM ROSMARINI.

Brandel, I. W., reports on an oil of rosemary from Tunis and gives the official requirements of the U. S. P. VIII, Ph. Austr. VIII, and the Ph. Hisp. VII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 154.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) note that the corrections of the U. S. P. up to June 1, 1907, require that rosemary oil should have an ester-content (bornyl acetate) at least 2.5 per cent; total borneol at least 10 per cent.

Henderson, H. John, discusses the optical rotation of oil of rosemary, reviews the literature on the subject and reports the examination of samples of oil having laevorotatory properties.—Pharm. J. Lond., 1907, v. 25, p. 599. (See also *Ibid.*, p. 695).

Schimmel & Co. (Semi-Ann. Rep., April, 1907, p. 90; also October, 1907, p. 81) point out that French rosemary oil is deserving of attention and also call attention to the adulteration that is practiced in the Dalmatian variety of this oil.

Hankey, William T., reports on 12 samples of oil of rosemary which represented only the best obtainable; none met the require-

ments as regards amount of bornyl acetate and borneol. The lowest amount of bornyl acetate observed was 2.25 per cent and the highest amount 6.1 per cent. The refractive index ranged from 1.4663 to 1.4707.—*Am. Druggist*, N. Y., 1907, v. 50, p. 8.

Gausby, R. A., points out that rosemary oil of U. S. P. quality is very difficult to procure.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 77.

Gane, E. H., gives a table showing the results of his examination on 6 samples of oil of rosemary. The samples varied in specific gravity from 0.894 to 0.906. Optical rotation from -1 to $+23.5$. Bornyl acetate from 1.7 to 5.5 per cent. Total borneol from 10 to 15.4 per cent. One was not soluble in 10 volumes 80 per cent alcohol, two were soluble in 2 volumes 80 per cent alcohol, one was not soluble and two were soluble in 20 volumes 80 per cent alcohol.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 329.

Patch, E. L., examined 4 samples varying in specific gravity from 0.900 to 0.9072. Bornyl acetate from 1.21 per cent to 6.33 per cent and total borneol from 8.88 per cent to 12.47 per cent. 2 had a rotation of $+9.3$ and $+3$. The first 10 cc. of the distillate from one sample had a rotation of -1.6 , which is contrary to standard.—*Ibid.*, v. 55, p. 329.

OLEUM SABINÆ

Hesselbo, A., presents a morphologic-anatomic examination of *Juniperus sabina* and other species of *Juniperus* with illustrations.—*Arch. f. Pharm., og. chem.* Copenhagen, 1907, v. 14, pp. 85–100.

Rodié, J. (*Rev. gén. chim.*, 9, 444; 10, 18), describes the botanical characteristics of the four species, savin, Phœnician juniper, common juniper, and cade, from which these oils are derived, and presents a summary of the more important contributions to the literature of the oils.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 1042.

Perrot (*Rép. de Pharm.*, 1907, No. 9) asserts that savin tops are in France almost completely substituted by the tops of *Juniperus phœnicea*, the activity of which is materially inferior to that of the genuine drug.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 174.

Rodié, J., contributes a study of the chemical composition of the oil of *Juniperus phœnicea*.—*Bull. de la Soc. de chim. de France*, Par., 1907, v. 1, pp. 492–497.

Blome, Walter H. (com. on adulterations), reports examining one sample that required 4 volumes of 90 per cent alcohol to effect solution, and had a specific gravity of 0.8564, instead of 0.903 to 0.923.—*Proc. Michigan Pharm. Ass.*, 1907, p. 70.

Caspari, Chas. E. (com. on adulterations), examined 3 samples, all contained turpentine.—*Proc. Missouri Pharm. Ass.*, 1907, p. 147.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 41) examined 3 samples having a specific gravity of 0.927, 0.920, and

0.926; optical rotation $+49^{\circ} 30'$, $+43^{\circ}$, and $+42^{\circ} 38'$, respectively. All were soluble in one-fourth volume of 90 per cent alcohol.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, 89) announce that they have recently detected "citronellol" in a fraction of oil of savin boiling higher than sabinol—this fraction boiling at 78° to 94° C. (4 mm. pressure and at ordinary pressure, between 220° and 237° C.).

Kondo, H., reports an examination of the oil of *Juniperus chinensis* and concludes that the cedrol of this oil is identical with the cedrol of *J. virginiana*. The empiric formula and the chemical behavior of the cedren of the two oils are identical, while their physical properties, specific gravity, optical rotation, etc., are quite different.—J. Pharm. Soc., Japan, 1907, pp. 230–236, 372.

OLEUM SANTALI.

Brandel, I. W., reviews the literature of 1905, bearing on oil of sandalwood, and gives the pharmacopœial requirements included in the U. S. P. VIII, and the Ph. Austr. VIII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 58.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) point out that the U. S. P. corrections up to June 1, 1907, require that sandalwood oil have a specific gravity of from 0.965 to 0.980. They also note (*Ibid.*, p. 104) the following requirements for sandalwood oil in the new Ph. Dan.: Fairly viscid; light yellow to yellow; specific gravity from 0.975 to 0.980 at 15° C.; at 20° C. soluble in 5 volumes dilute alcohol; the solution must also remain clear if more alcohol is added. They suggest that the upper limit of value of the specific gravity is too low; it should be 0.985.

Also (*Ibid.*, April, 1907, p. 109) assert that the proposed Ph. Brit. requirements for the santalol content in sandalwood oil is not justified. In the case of good oils it is not below 90 per cent calculated for the formula $C_{15}H_{24}O$.

Löhr, H., (Chem. Ztg., 31, 1040) reports the following constants for sandalwood oil of authentic purity: Specific gravity, 0.972; optical rotation, -19.25° . Sandalwood oil content, 96 per cent; dissolves clear in 4 parts 70 per cent alcohol.—Chem. Abstr. Am. Chem. Soc., 1908, v. 2, p. 691.

Semmler, F. W., reports experiments to determine the nature of the sesquiterpenes in oil of sandalwood.—Ber. d. deutsch. Chem. Gesellsch. 1907, v. 40, III, pp. 3321–3324.

Parry and Bennett record some experiments made with two samples of sandalwood oil which they have reason to consider has been skillfully adulterated with so-called West Indian sandal oil.—Chem. & Drug., Lond., 1907, v. 69, pp. 19–20.

Dohme and Englehardt call attention to the statement of Schimmel & Co. that santal oil should have an optical rotation from 16° to 20° . They assert that they have distilled many lots of East Indian sandalwood oil and claim that the optical activity of from 16° to 20° , as given in the U. S. P., is not a criterion of the value of santal oil.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 380.

Bush & Co., W. J., communicate the results obtained in the examination of santal oil distilled by them from 16 parcels of genuine East Indian sandalwood.—Chem. & Drug., Lond., 1907, v. 69, p. 448.

Bernegau, Henry, found two samples of oil of sandalwood which had an optical rotation of -10.5 and -11.2 , respectively. Both assayed 91 per cent of santalol.—Am. J. Pharm. Phila., 1907, v. 79, p. 555.

Perrot, E., calls attention to the frequent and surprising adulterations of santal.—Bull. d. sc. pharmacol. Par., 1907, v. 14, p. 350.

Blome, Walter H., (com. on adulterations) reports that a few samples have traces of chlorinated products. All assayed over 90 per cent of santalol, some consisting almost entirely of that substance.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, pp. 40, 41) report on 40 samples of santalwood oil, mainly of their own manufacture, which were found to fall between these limits: Specific gravity, 0.975 to 0.980; optical rotation, $-14^{\circ} 18'$ to $-22^{\circ} 16'$; 91.5 to 96.4 per cent total santalol. The majority were soluble in 6 volumes of 70 per cent alcohol, or less, although they noticed that a slight amount of heat was sometimes necessary to produce a clear solution. The B. P. C., following the recommendation of the revision committee, suggests 94 per cent of santalol as a normal content of a good oil.

An unsigned article points out that the essential oil distilled from so-called African sandalwood is not the product of *Santalum album* and it is probable that the plant from which it is obtained does not even belong to the *Santalaceæ* at all; the name is merely a "courtesy title." The oil has a specific gravity of 0.959; optical rotation, -40.6° ; acid value, 1.7; saponification value, 17.9; and acetyl-saponification value, 88.3.—Chem. & Drug. Lond., 1907, v. 70, p. 228.

OLEUM SASSAFRAS.

Brandel, I. W., gives the pharmacopœial constants for sassafras oil included in the U. S. P. VIII, and the Ph. Austr. VIII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 61.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) note that in the corrections of the U. S. P. up to June 1, 1907, the special requirements of solubility of sassafras oil no longer exist.

Caspari, Chas. E. (com. on adulterations), examined 11 samples, 8 satisfactory; 3 low in specific gravity.—*Proc. Missouri Pharm. Ass.*, 1907, p. 142.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907–1908, p. 41) examined 6 samples ranging from 1.072 to 1.082 in specific gravity; from $1^{\circ} 40'$ to 3° optical rotation and were soluble in $3\frac{1}{2}$ volumes of 90 per cent alcohol.

OLEUM SINAPIS VOLATILE.

Brandel, I. W., gives the requirements for oil of mustard as they appear in the U. S. P. VIII, and the Ph. Austr. VIII.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, p. 62.

Pleijel, C. (*Farmac, Revy*, 1907, p. 204), outlines a modification of the assay methods, proposed by Gadamer and by Dietrich, for allylthiocyanate in volatile oil of mustard. The essential features of this modification differ from the U. S. P. method in heating the mixture of oil and reagents for three hours at a temperature of from 45 to 50° C. in place of allowing the mixture to stand for 24 hours and then heating to 80° C. for half an hour.—*Jahresb. d. Pharm. Göttingen*, 1907–1908, v. 42, p. 209.

Schimmel & Co. (*Semj-Ann. Rep.*, April, 1907, p. 71) call attention to a communication by Pomeranz, who endeavors to explain the rearrangement which must be assumed to occur in the formation of allyl cyanide.

Patch, E. L., reports the examination of a specimen of oil of mustard which contained 93.48 per cent of allyl-iso-thiocyanate.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 328.

OLEUM THEOBROMATIS.

Gilmour, J. P., found the average melting point of 9 samples higher than the Ph. Brit. requirements, due to the presence of foreign fats.—*Pharm. J. Lond.*, 1907, v. 25, p. 109.

Perrot, E., calls attention to the numerous adulterants of cacao butter.—*Bull. d. sc. pharmacol. Par.*, 1907, v. 14, p. 350.

Wauters, J., (*Bull. Soc. Chimiq. de Belgique*, v. 21, pp. 240–242) discusses the recognition of substitutes for cacao butter added to chocolate and presents a table giving the constants of expressed and of extracted cacao butter and of cacao butter substitutes.—*Jahresb. ü. Tier Chem. Wiesb.*, 1907, v. 37, p. 69.

OLEUM TEREBINTHINÆ.

Brandel, I. W., reviews some of the recent literature on oil of turpentine, particularly American oil of turpentine and turpentine oil from Venetian turpentine.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, pp. 296–298.



An editorial calls attention to an indictment against the quality of the oil of turpentine on the market drawn up by the pharmacists of Georgia.—Am. Druggist, N. Y., 1907, v. 50, p. 218.

A news item discusses the future of the turpentine industry in the United States, and calls attention to an improved method for collecting turpentine.—Pharm. J. Lond., 1907, v. 25, p. 197.

An unsigned article discusses the development of the turpentine industry in east Texas.—Paint, Oil and Drug Rev., Chicago, 1907, v. 44, August 28, p. 8.

Teepie, J. E., discusses the production of a turpentine from waste wood.—J. Soc. Chem. Ind., Lond., 1907, v. 26, pp. 811–812. (See also Sc. Am. Suppl., N. Y., 1907, v. 64, pp. 194–195.)

Schimmel & Co. (Semi-Ann. Rep., April, 1907, pp. 97–101) discuss the production of oil of turpentine in India, also call attention to an examination of Japanese turpentine (from *Pinus thunbergii*) and some additional work on pitch and terpenes from the Norway pine and the Douglas fir.

For additional comments on turpentine oil, see *Ibid.*, October, 1907, pp. 92–96.

An abstract from the *Grocer* points out that oil of turpentine evidences an extraordinarily wide divergence in prices as current on the London market.—Pharm. J. Lond., 1907, v. 25, p. 625.

Flath, W., (Farben Ztg., 1907, v. 13, p. 78) discusses the various adulterants that are being used for oil of turpentine and their detection.—Chem. Report. Cöthen., 1907, v. 31, p. 564.

Herzfeld, H., discusses oil of turpentine and turpentine substitutes and the various methods that are or may be used for differentiating between them.—Ztschr. f. öffentl. Chem., 1907, v. 13, pp. 432–436.

An abstract calls attention to some of the substitutes for oil of turpentine that are being marketed at the present time and points out that in the majority of cases these substitutes contain no turpentine oil at all, but are mixtures of well-graduated and selected fractions of petroleum, water, gas-tar or coal-tar hydrocarbons, having approximately the same specific gravity and boiling point as the real oil. Rosin spirit also enters largely into the composition of some turpentine substitutes.—Pharm. J. Lond., 1907, v. 24, p. 46.

Thurston, Azor, asserts that the American oil of turpentine obtained from *Pinus palustris* and the English oil of turpentine from *Pinus australis* are dextrorotatory. He records a number of observations and also gives the variation of optical rotation evidenced by German and Russian oils which are lævorotatory.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Vézes and Mouline (Procès-Verbaux des Séances de la Soc. des sc. phys. et nat. de Bordeaux) report the results of their studies on the

mutual solubility of oil of turpentine and dilute alcohol.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2530.

McGill, A., discusses the examination of turpentine, and concludes: (1) The Hübl method is preferable to the Hanus method when working with oil of turpentine. (2) The Worstall number (370 per cent) is correct for turpentine, when Hübl solution is used, as specified. (3) With the Hanus method and solution the number 200 may be accepted as indicating genuine turpentine. (4) Turpentines containing ordinary adulterants give numbers lower than 370 (Hübl) or 200 (Hanus). (5) The specific refraction for genuine turpentine, at 20° C., is nearly 1.47. (6) Ordinary adulterants reduce the specific refraction. (7) Decidedly more characteristic numbers, both in refraction and in iodine absorption, are obtained by work on fractions of 25 per cent volume. (8) The iodine number, specific refraction, and temperature of distillation for fraction of 25 per cent volume suffice to distinguish between genuine turpentine and the adulterated article as now found on the market.—J. Soc. Chem. Ind. Lond., 1907, v. 26, pp. 847-848.

Fischer, Richard, found a sample of oil of turpentine which contained 75 per cent of kerosene oil.—Proc. Wisconsin Pharm. Ass., 1907, p. 34.

Gausby, R. A., reports that none of the samples of turpentine examined were adulterated, but all ran considerably below U. S. P. specific gravity. The average specific gravity of the turpentine in the market is about 0.885 at 25° C.—Proc. Pennsylvania Pharm. Ass., 1907, p. 78.

Gilmour, J. P., points out that ordinary commercial oil of turpentine is too often supplied for medicinal purposes, and suggests that rectified oil only be used.—Pharm. J. Lond., 1907, v. 25, p. 110.

Péju, G., presents a brief note on the bactericidal action of oil of turpentine.—Compt. rend. Soc. de biol. Par., 1907, v. 62, p. 955.

Williams, J. H., (Charlotte, N. C., M. J., 1907, xxxi, 127-130) discusses the therapeutic uses of turpentine. Reference from Index Medicus, 1907, v. 5, p. 1040.

Coltart, Guy H., reports a case of severe poisoning from the fumes of turpentine, with recovery on being removed from the room which had been newly painted.—Lancet, Lond., 1907, v. 172, p. 1014.

OLEUM THYMI.

Brandel, I. W., calls attention to some recent investigations of oil of thyme, and presents the official requirements in the U. S. P. VIII, and the Ph. Hisp. VII.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 181.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 102) note that the corrections of the U. S. P. up to June 1, 1907, permit that thyme oil be colorless or reddish.

Rodié, M., presents a table and a chart giving analytical results of a study of various samples of Spanish oil of thyme.—Bull. de la Soc. de chim. de France, Par., 1907, v. 1, pp. 236–239.

Schindelmeizer, J., (Apoth. Ztg., xxii, 1907, No. 79, 853) obtained from French oil of thyme, after prolonged standing, a crystalline deposit having a faint thyme odor, which disappeared completely after crystallization from hot water, in which it was freely soluble, while in cold water the crystals were sparingly soluble.—Proc. Am. Pharm. Ass., 1908., v. 56, p. 343.

Mitchell, Edward, asserts that oil of red thyme is universally supplied for so-called pure *origanum*.—Proc. Arkansas Pharm. Ass., 1907, p. 90.

Gausby, R. A., reports one lot of red thyme oil containing turpentine and assaying only 14.5 per cent of phenols. All other lots examined were pure, ranging from 22 to 27 per cent of phenols.—Proc. Pennsylvania Pharm. Ass., 1907, p. 77.

Bernegau, Henry, reports a sample of oil of thyme which complied with the U. S. P. requirements for solubility, specific gravity, and phenol content but had an optical rotation of $+9.5$ in place of being slightly *lævogyrate*.—Am. J. Pharm., Phila., 1907, v. 79, p. 554.

Gausby, R. A., reports samples containing turpentine and assaying below 20 per cent phenols.—Proc. Pennsylvania Pharm. Ass., 1907, p. 77.

Gane, E. H., examined a specimen which had a specific gravity of 0.8687, rotation—17; phenols, 10 per cent; not soluble in 10 volumes of 80 per cent alcohol. Contained turpentine.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 329.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 45) found the phenol content of seven samples, estimated by the potash method, to be 15, 16, 18, 20, 23, 30, and 58 per cent. Some French oils by the best makers only contain 15 or 16 per cent of phenols.

OLEUM TIGLII.

Ebert, Felix, in discussing the fruits and seeds used as medicines in China calls attention to the Chinese names and uses of *Croton tiglium*, L.—Ztschr. d. allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 541.

Hankey, William T., reports that for several years croton oil has shown a uniformly higher iodine absorption than the required 102 to 105, usually ranging from 108 to 110. These results were obtained by the official method for determining iodine absorption. He much prefers Wijs' method for routine work, as results are obtained within one-half to one hour's time. The latter method gives uniformly higher results than the U. S. P. method.—Am. Druggist, N. Y., 1907, v. 50, p. 8.

Norris, Richard C., is reported to have said that he regarded elimination by the bowels as of prime importance in the treatment of eclampsia and that he had yet to see a woman die of eclampsia after he had secured from 12 to 20 stools in twenty-four hours. He uses Epsom salt, and if this is vomited from 3 to 5 drops of croton oil are given in sweet oil.—*N. York M. J.*, 1907, v. 85, p. 765.

OPIUM.

Greenish, Henry G., points out that the international agreement requires the opium to be dried at 60° C. and standardized to 10 per cent of morphine. The Ph. Austr., Ph. Belg., Ph. Ndl., and Ph. Hisp. comply with this requirement, but the U. S. P. retains a standard of 12 to 12.5 per cent of morphine in opium dried at 85° C. He thinks it would have been very simple for the U. S. P. to have adopted the international standard for powdered opium, and so completed the uniformity for this important drug.—*Pharm. J. Lond.*, 1907, v. 24, p. 832.

Bührer, C., points out that with the single exception of the U. S. P. all of the newer pharmacopœias require an uniform standard of 10 per cent of morphine for powdered opium. The U. S. P. also requires from 1.2 to 1.25 per cent of morphine in tincture of opium in place of 1 per cent specified in the international protocol.—*Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich*, 1907, v. 45, p. 419.

Nelson, Burt E., discusses the origin of opium, the appearance of the powder, the cellular elements contained in the drug, and the possible differentiation between the several kinds of opium.—*Merck's Report*, N. Y., 1907, v. 16, p. 220.

Kline, C. M., presents some notes on opium from the commercial standpoint, and reviews the several varieties of opium under main geographical headings. Thus he considers: Turkey opium, Persian opium, Egyptian opium, and India opium.—*Am. J. Pharm., Phila.*, 1907, v. 79, pp. 156–160.

Gehe & Co. (*Handels-Bericht*, 1907, p. 43) discuss the market conditions relating to opium, note the increased consumption of the drug, and call attention to the decree recently issued by the Chinese Government for the suppression of the opium trade.

Consul E. L. Harris reports that the average crop of opium in Asia Minor is 6,000 baskets of 60 okes each, making a total of 450 tons; but so much depends upon the temperature prevailing after the crops are planted in October that the production often rises as high as 10,000 baskets and, on the other hand, occasionally falls as low as 4,000.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 72, July 1, p. 26.

An editorial discusses the economic conditions prevailing in regard to opium, and presents statistics of the number of cases of the drug produced and the highest and lowest price during the years from 1870 to 1907.—Meyer Bros. Drug., St. Louis, 1907, v. 28, p. 320.

Thoms, H., reports on the cultivation of the opium poppy and the production of opium at Dahlen, near Berlin. He reviews some of the experiments that have been made in countries outside of Asia in the production of opium and records his own experiments at some length.—Ber. d. Pharm. Gesellsch., Berl., 1907, v. 17, pp. 4–60.

An editorial discusses the records of the cultivation of opium by one John Ball, who in 1795 received from the Society of Arts the sum of 50 guineas for a description of his method of preparing opium from poppies grown in England, and compares them with the records of the work done by Professor H. Thoms, at the Berlin University Pharmaceutical Institute.—Chem. & Drug., Lond., 1907, v. 70, pp. 261–262.

An unsigned article (reprinted from the Scientific American) reviews the opium industry, and points out that up to the twelfth century Asia Minor was the only source of supply.—Pharm. J. Lond., 1907, v. 24, pp. 692–693.

Malin-Punkalaidun, Allan, reports on the examination of ripe, and unripe poppy capsules to determine their alkaloid content. He found from 0.02 to 0.05 per cent of morphine in unripe capsules and 0.018 per cent of the same alkaloid in the ripe capsule. The narcotine-codeine content varied from 0.0113 per cent in the unripe capsule to 0.0280 per cent in the ripe capsule.—Ber. d. pharm. Gesellsch., Berl., 1907, v. 17, pp. 60–61.

A news note reports that the poppy work done in connection with the Bureau of Plant Industry has not made the desired progress.—Oil, Paint and Drug Reporter, N. Y., 1907, v. 71, March. 25, p. 25.

An editorial discusses the possibility of cultivating a poppy in India which will yield an opium containing a higher percentage of morphine.—Pharm. J. Lond., 1907, v. 24, p. 426.

Michael, W. H., in a consular report gives some interesting particulars in regard to the cultivation of opium in India.—*Ibid.*, v. 25, pp. 335–336.

An editorial comments on the production and use of Indian opium and points out that all of the Indian opium which comes to London is transhipped to the West Indies and other parts, where Asiatics want it for smoking purposes. It is not used here either for medicinal or manufacturing purposes.—Chem. & Drug., Lond., 1907, v. 70, p. 935.

Greenish, H. G., points out that while the Ph. Brit. authorities might wish to retain Indian opium for Indian use, it was desirable to restrict Great Britain to the use of Turkey opium and let Indian

pharmacists use their own opium. The vast difference in the two drugs would indicate that they should not be used indiscriminately.—Pharm. J. Lond., 1907, v. 24, p. 172.

Puckner, W. A., reviews the literature of 1906 relating to the assay of opium.—Pharm. Rev., Milwaukee, 1907, v. 25, pp. 328-330.

Kwisda, A., reviews the advances that have been made in the chemistry of the opium alkaloids during the year 1906.—Pharm. Post, Wien, 1907, v. 40, p. 153.

Parker, C. E., discusses the assay of opium and outlines a method of assay in which lead subacetate is used to precipitate coloring matter and extractive.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 490, 497.

The method for the analysis of opium as outlined by the Association of Official Agricultural Chemists describes in detail the method to be used in the determination of morphine.—Bull. Bur. Chem., U. S. Dept. Agric., 1907, No. 107, pp. 201-202.

Dott, D. B., discusses the processes for opium assay that are included in the Ph. Brit. and in the U. S. P. He points out that one of the reasons why results with moist, lump opium are not so constant is due to the difficulty of securing representative samples. Pharm. J. Lond., 1907, v. 24, p. 78.

Farr and Wright report experiments on the assay of opium, the loss of morphine, and the correction for opium extractive dissolved; also the loss of water in drying, the amount of impurity in crude morphine, and the determination of alkaloids other than morphine.—*Ibid.*, v. 24, pp. 164-169.

Dott, D. B., discusses the paper by Farr and Wright on the assay of opium for the purpose of bringing out more distinctly some points that have not been called attention to by himself or by Farr and Wright.—*Ibid.*, v. 24, pp. 356-357.

Caesar and Loretz (Geschäfts Ber., 1907, pp. 39-42) assert that the assay of opium is by no means perfected to such a degree that any one method can be considered as being above criticism. They discuss the modified Helfenberg method, and suggest several modifications. Also outline (*ibid.*, 1907, pp. 97-98) their assay process for opium, and point out the requirements made for this drug by the several pharmacopœias.

Tickle, Thomas, describes a new process for the morphimetric assay of opium, the essential point of which consists in the employment of metacresol as a solvent of the alkaloid.—Pharm. J. Lond., 1907, v. 24, pp. 162-164.

Wöhlk, Alfred, describes and figures a flask to be used in the determination of morphine in opium.—Arch. f. Pharm. og. Chem. Copenhagen, 1907, v. 14, p. 302.

Abel Scholar thinks the use of tared filter-papers for weighing is very objectionable, as anyone can prove who cares to make the experi-

ment. Filter-papers can easily be obtained which do not yield any "fluff" to gentle brushing with camel-hair brushes, and the precipitated morphine could be transferred to a tared dish and dried in a more orthodox way.—Chem. & Drug., Lond., 1907, v. 70, p. 349.

Reichard, C., discusses the reactions of narcotine.—Pharm. Zentralh., 1907, v. 48, pp. 44–51.

Also reviews and discusses the characteristic reactions of papaverine.—*Ibid.*, v. 48, pp. 288–290, 313–315, 334–336.

Zimmermann, Albert, outlines a method for determining the codeine content of opium, which depends on the ready solubility of codeine in water as compared with the other alkaloids contained in the opium. The method as outlined is adapted to be used in connection with the morphine assay. Smyrna opium seldom contains more than 0.5 per cent of codeine. Salonica opium is richer, yielding from 0.5 to 1 per cent.—Oil, Paint and Drug Reporter, New York, v. 72, Dec. 30, p. 52.

van der Harst, J. C., reports on a sample of opium that could not be assayed because of the formation of a permanent emulsion with ether.—Pharm. Weekbl., 1907, v. 44, p. 1506.

Philipp Röder (Jahresbericht, Wien, 1907, p. 97) reports a sample of opium which contained 13.67 per cent of ash; this was rejected. Six additional samples varied from 11.60 to 13.60 per cent of morphine.

Gausby, R. A., reports one sample of nice-appearing gum which was found to be heavily loaded with lead slugs. In spite of this fact, a tincture made from it assayed considerably over standard.—Proc. Pennsylvania Pharm. Ass., 1907, p. 76.

Vanderkleed, Charles E., reports 8 assays of gum opium ranging from 10.00 to 15.740 per cent. Quality very good.—*Ibid.*, 1907, p. 90.

The inspectors of pharmacies assert that the assay of opium varies considerably, and that much of the available drug has been manipulated.—Ann. de pharm. Louvain, 1907, v. 13, p. 279.

Mossler, Gustav, examined 8 samples of opium, the morphine content of which varied from 6.7 per cent to 13.84 per cent.—Ztschr. d. allg. österr. Apoth. Ver., Wien, 1907, v. 45, p. 38.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 35) examined 15 parcels of opium which ranged from 10 to 12.5 per cent of morphine content on the raw opium as received.

Blome, Walter H., (com. on adulterations) reports that powdered opium sometimes assays a little high.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Bachman, Gustav, (com. on adulterations) reports powdered opium assaying 11.78 per cent of morphine in place of 12 to 12.5 per cent required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Martin, A., reports experiments with an abnormal extract of opium that did not yield to the pharmacopœial method for the assay of opium, and which on further investigation was found to contain a resinous substance.—*J. de pharm. d'Anvers*, 1907, v. 63, pp. 241-242.

Crouzel, Ed., discusses the variability of extract of opium, and urges a greater uniformity.—*Répert. de pharm. Par.*, 1907, v. 19, p. 489.

Yvon, M. P., discusses the official French preparations of opium and reviews the changes that have been made in the formulas for the several preparations in the Codex.—*Bull. Soc. de pharm. de Bordeaux*, 1907, v. 47, pp. 275-285. (See also *J. de pharm. et de chim. Par.*, 1907, v. 26, pp. 337-347.)

Benfield thinks that melted paraffin yields a much more thoroughly deodorized tincture of opium, and that the process is much more convenient than the official process of shaking with petroleum benzin.—*Bull. Am. Pharm. Ass., Chicago*, 1907, v. 2, p. 121.

Greenish, Henry G., points out that the International Agreement standardizes tincture of opium to 1 per cent of morphine. The U. S. P. is the only one which fails to comply, and still requires 1.25 per cent of morphine.—*Pharm. J. Lond.*, 1907, v. 24, p. 832.

Amos, W. S., outlines a quick and efficient method for the preparation of tincture of opium. He heats the water to the temperature directed in the U. S. P. and adds two ounces of paper pulp to the hot water, and agitates the mixture until the pulp is thoroughly disintegrated. To this mixture he adds the powdered opium and proceeds as directed in the U. S. P.—*Proc. Kansas Pharm. Ass.*, 1907, p. 42.

Sayre, L. E., reports on two assays of tincture of opium which contained 0.108 and 0.1935 per cent of morphine, respectively.—*Bull. Kansas Bd. Health*, 1907, p. 10.

Niece, Frederic E., outlines and describes a color reaction which he suggests for testing the identity of tincture of opium.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 483.

Baird, J. W., (com. on adulterations) reports 4 samples, 2 genuine, 2 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

Spindler reports that but one of 14 samples of tincture of opium examined contained more than the minimum of morphine required by the Ph. Germ. IV.—*Suedd. Apoth. Ztg.*, 1907, v. 47, p. 50.

Stansfield, J. M., asks of what earthly use is the glycerin in camphorated tincture of opium.—*Proc. Florida Pharm. Ass.*, 1907, p. 9.

Greenish, Henry G., points out that the international agreement requires that "*Opium et Ipecacuanhæ Pulvis*" contain 10 per cent of powdered opium. All the pharmacopœias agree, but the powdered opium of the U. S. P. is 20 per cent stronger than that of the others.—*Pharm. J., Lond.*, 1907, v. 24, p. 832.

Holmes, E. M., describes and figures a plant, *Combretum sundaicum* Mig., to which allusion has been made as a reputed remedy for the opium habit.—*Ibid.*, v. 24, p. 77. (See also *Ibid.*, v. 25, pp. 358–359.)

Wray, L., presents some additional information on the antiopium remedy derived from *Combretum sundaicum*, the method for its preparation, and the exact method of use.—*Ibid.*, v. 24, p. 453.

Hooper, David, discusses the probable origin of the antiopium leaf and points out that some years ago a preparation of the bark of *Cinchona succirubra* was sold as a remedy for inebriation, and that it is interesting to notice that another plant of the same order is now being put forward as a cure for a similar evil, the opium habit.—*Ibid.*, v. 24, p. 453.

Weichardt and Stadlinger find that there is an albumin splitting antibody of the character of a fatigue toxin, recognized as well by its biologic action as by a specific antibody, which is found not only in the animal but in the vegetable kingdom—for example, as a constituent of opium. This can be prepared pure after the previous removal of the alkaloids and by dialysis. A part of the complex action of opium may be traced to the presence of this antibody.—*Biochem. Ztschr.*, Berl., 1907, v. 3, pp. 431–438.

Zemp, E. R., discusses the absorption and elimination of some commonly used drugs, and calls attention to the necessity of knowing how absorption and elimination take place, but he states that many drugs in common use are not understood in this particular. He discusses opium, cocaine, digitalis, nitroglycerin, belladonna, chloral, and iodoform.—*J. Am. M. Ass.*, 1907, v. 49, pp. 1349–1352.

Wiley, H. W.; said, in discussing the physician's connection with the proprietary remedies, the saddest thing of all is the connection of the medical profession with so-called opium, morphine, and liquor habit cures. Instead of trying to help the unfortunates, the purpose seems to be to fasten the habit more firmly upon the victims.—*Ibid.*, v. 49, p. 1586.

Guernsey, Joseph C., asserts that opium in potentized form is one of the best remedies in the homœopathic materia medica for chronic constipation. He has used it so successfully for that condition that it is almost always the first curative agent that comes to his mind when treating constipation. He asserts that it should be given insistently and persistently in all cases of old, stubborn, seemingly incurable cases of constipation before resorting to palliatives or patent medicines.—*Hahnemann. Month.*, Phila., 1907, v. 42, p. 60.

A number of references on the varied uses of opium will be found in the *Index Medicus* and the *J. Am. M. Ass.*

PANCREATINUM.

Koch, F. C., discusses the U. S. P. assay process for pancreatin and points out a number of details in the manipulation that should be closely observed if correlating results are to be obtained.—*Proc. Am. Pharm., Ass.*, 1907, v. 55, pp. 373-374.

Francis, J. M., asserts that the U. S. P. test for pancreatin can be "jockeyed" and that the results depend largely on the amount and strength of the nitric acid used and are further influenced by the nature and kind of milk employed. The starch test is also considered to be unsatisfactory.—*Ibid.*, v. 55, pp. 374-375.

Delezenne, C., (*Comptes-rend.*, 1907, 144, 388) reports additional investigations on the influence of calcium salts on pancreatic digestion, and asserts that when the pancreatic ferment has once acquired the active trypsin-like power, the presence of the lime salt is no longer essential, and that after the entire removal of the calcium salts the ferment still retains its power of digesting albumin and gelatin.—*Pharm. J. Lond.*, 1907, v. 24, p. 433.

Sollmann, Torald, calls attention to the absurdity of mixtures of the digestive ferments in which one is certain to destroy the other, as in the elixir digestivum of the National Formulary. The effects of the various digestive ferments are tabulated.—*J. Am. M. Ass.*, 1907, v. 48, pp. 415-416, 521-522.

A report to the Council on Pharmacy and Chemistry summarizes the results of the examination of a number of proprietary mixtures of digestive enzymes.—*Ibid.*, v. 48, pp. 434-435.

An editorial discusses the report of the council, just referred to, under the title "Monstrosities in combinations of digestive ferments," and states that the fact that such preparations are on the market is a reflection on those who make them as well as on those who use them.—*Ibid.*, v. 48, pp. 423-424.

Metcalfe, B. F., expresses amazement and disgust that an eminent practitioner should have prescribed lactopeptine and takadiastase for his infant, after the recent exposure by the Council on Pharmacy and Chemistry.—*Ibid.*, v. 48, p. 1794.

An abstract from the Medical Press and Circular comments on the claims of Beard as the discoverer of the use of trypsin in the treatment of cancer, and points out that so far trypsin has failed to fulfill the claims that have been advanced in its favor, and its usefulness has not been confirmed by the cancer research fund.—*Pharm. J. Lond.*, 1907, v. 24, p. 65.

Graves, William P., is reported to have said that he used trypsin in 6 cases of recurrent cancer. Four of these patients died and the others will die, but the treatment helps to prolong life and to keep the nodules under control.—*J. Am. M. Ass.*, 1907, v. 49, p. 1950.

Cleaves, M. A., (Med. Rec. N. Y., June 1) discusses the physiologic action of the pancreatic enzymes, used hypodermatically directly into the growth, by rectum or by mouth. The amylopsin controls the poisonous symptoms caused by the trypsin. The growth is sometimes absorbed.—*Ibid.*, v. 48, p. 2075.

Additional references on the use of pancreatin and the enzymes contained therein will be found in the Index Medicus and the J. Am. M. Ass.

PARAFFINUM.

Gilmour, J. P., reports 2 out of 13 samples of paraffinum durum below Ph. Brit. standards; melting point 59° C.—Year Book of Pharmacy, Lond., 1907, pp. 446-455.

Wilder, W. H., stated that paraffin is often useful in distending the lachrymal sac preliminary to operation.—J. Am. M. Ass., 1907, v. 49, p. 165.

Davis, A. E., protests against the use of paraffin injections near the eye and cites experiences in two cases in support of his contention.—*Ibid.*, v. 49, pp. 215-218.

An editorial calls attention to a source of possible danger in paraffin prosthesis which had been overlooked until Heidingsfeld reported such an occurrence; this consists in the development of connective tissue resulting from the long-continued slight irritation from the paraffin.—*Ibid.*, v. 48, p. 1682.

Harris, M. L., calls attention to the unsatisfactory results following the injection of paraffin for the relief of inguinal hernia, and reports four cases where he has been called on to operate on patients who had been treated by others with paraffin injections.—*Ibid.*, v. 49, p. 1352.

Additional references on the use of paraffin will be found in the Index Medicus and the J. Am. M. Ass.

PASTÆ DERMATOLOGICÆ N. F.

Runge observes that the fats directed in Unna's formulas for "pastes" must be only such as are benzoinated with benzoin—not with benzoic acid as directed by the Ph. Germ. IV. The incorporation of such substances as Kieselgur (Terra Silicea), etc., is best effected in an ointment mill or by the aid of a rolling machine. Trituration in a mortar will produce a satisfactory product only at the expense of much labor and time.—Pharm. Ztg., lii, 1907, No. 53, 555.

PEPSINUM.

Koch, F. C., discusses the U. S. P. methods for assaying pepsin and pancreatin and proposes several changes in the technique.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 372-374.

Sato, S., reports a study of the action of anilin coloring matter upon diastase and pepsin.—*J. Pharm. Soc., Japan*, 1907, p. 1132.

Cowie and Dickson report some further work on the assay of pepsin by the biuret reaction and conclude that this method is preferable because it is a measure of the actual peptonizing power, as distinct from the solvent action of pepsin. The method gives comparable results, can be carried out in a short time, and requires no special apparatus.—*Pharm. J., Lond.*, 1907, v. 24, pp. 198–199.

Tankard, Arnold R., discusses a recent paper by Cowie and Dickson on the assay of pepsin. He thinks that as a pharmaceutical test-process the method proposed is not sufficiently simple, and that it possesses little, if any, advantage in this respect over that devised by Allen.—*Chem. & Drug. Lond.*, 1907, v. 70, p. 349.

Fuld and Levison discuss the estimation of pepsin by the edestin test, a method based upon one first proposed by Jacoby, which was dependent upon the clearing up of a turbid ricin solution by means of pepsin-hydrochloric acid.—*Biochem. Ztschr. Berl.*, 1907, v. 6, pp. 473–501.

Küttner, S., (*Chem. Lab. Inst., Exp. Med. St. Petersburg, Z. physiol. Chem.* 52, 63–90) states that Volhard's method for pepsin estimation is to digest casein hydrochloride with the solution and estimate the digestive action through the amount of HCl liberated.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 2900.

Mossler, Gustav, reports that he examined 6 samples of pepsin and found 2 which did not comply with the official test for digesting qualities.—*Ztschr. d. allg. österr. Apoth. Ver., Wien*, 1907, v. 45, p. 38.

Blome, Walter H., (com. on adulterations) reports the examination of a sample of pepsin which was claimed to test 1:10,000, but which actually tested 1:7,000.—*Proc. Michigan Pharm. Ass.*, 1907, p. 70.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 37) report 3 samples of "scale" pepsin which failed to answer the Ph. Brit. albumin test.

Scoville, W L., (*Drugg. Circ.*, April, 1907, 294) says that the angelica wine in essence of pepsin should not be fortified, but should be as low in alcohol as possible, to insure an active preparation. Ten per cent of alcohol in the finished preparation is better than 15, because the pepsin will be more active.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 668.

Simms, G. G. C., points out that the presence of hydrochloric acid of greater strength than 0.5 per cent inhibits and rapidly destroys the proteolytic activity of pepsin, and that at least three preparations of the National Formulary contain upward of 1 per cent of hydrochloric acid in solution.—*Am. Druggist, N. Y.*, 1907, v. 50, p. 198.

A report of the Council on Pharmacy and Chemistry states that "Lactopeptine" (powder) contains somewhat less than 10 per cent of official pepsin, and no trace of diastase or pancreatin.—*J. Am. M. Ass.*, 1907, v. 48, p. 959.

Miller, Charles H., reports on the examination of lactopeptine, confirming that of the Council on Pharmacy and Chemistry just cited.—*Ibid.*, v. 48, p. 1047.

An editorial in discussing the prescribing of the digestive ferments in combination controverts the frequently held opinion that a mixture of pepsin, pancreatin, and hydrochloric acid tends to decompose, and expresses the belief that practical therapeutics is very often thrown into confusion and pushed backward into the darkness by faulty, hasty, inconclusive, or misinterpreted laboratory experiments.—*Critic and Guide*, New York, 1907, v. 9, May, pp. 14–16.

Sailer and Farr discuss the natural and artificial inhibition of peptic digestion, and conclude that albumin and some of the sugars inhibit the action of pepsin, but they do not play an important rôle in gastric digestion. Certain antiseptics are also discussed.—*Am. J. M. Sc.*, Phila., 1907, v. 133, pp. 113–127.

Additional references on the use of pepsin will be found in the *Index Medicus* and the *J. Am. M. Ass.*

PETROLATUM.

Remington, Joseph P., reports that under the article petrolatum, p. 336 U. S. P., last paragraph, the sulphuric acid test has been dropped.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 135.

Dulière, W., (*Journ. de Pharm. d'Anvers*, 1907, No. 16) finds the requirement of the Ph. Belg. that neither the vaseline nor the concentrated sulphuric acid shall be appreciably browned when equal quantities are heated in a clean test glass for 10 minutes in a steam bath, is too stringent and is not fulfilled by any commercial qualities of vaseline which have been examined. The corresponding tests of the Ph. Helv. and the Ph. Ndl. prescribe sulphuric acid of 60 per cent and 80 per cent, respectively, and these he considers the more practical strength under commercial conditions.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 306.

Troxell, H. L., (com. on adulterations) found several samples with a lower specific gravity than the U. S. P. requires.—*Proc. Maryland Pharm. Ass.*, 1907, p. 87.

PETROLATUM LIQUIDUM.

Gilmour, J. P., examined 9 samples of liquid paraffin and found 4 samples containing organic matter or excess of acid.—*Pharm. J. Lond.*, 1907, v. 25, p. 109.

PHENOL.

Murray, B. L., discusses the U. S. P. requirements for phenol and asserts that the boiling point, solubility in water, solubility in glycerin and water, and titration constitute a set of tests somewhat remarkable in their nature. He discusses the several requirements at some length.—Merck's Report, N. Y., 1907, v. 16, pp. 63–64. (See also *ibid.*, p. 248.)

Obermiller, Jul., discusses the literature and reports some additional experiments to determine the action of sulphuric acid on phenol.—Ber. d. deutsch. chem. Gesellsch., 1907, v. 40, III, pp. 3623–3647.

Raschig, F., discusses the ferric chloride reaction of phenol and reviews the history of phenol.—Ztschr. f. ang. Chem., Berl., 1907, v. 20, p. 2065.

Kahn, Joseph, outlines several tests to differentiate phenol from creosote, cresol, and related compounds.—Proc. New York Pharm. Ass., 1907, p. 241.

Klose, G., found it impracticable to determine the phenol dissolved in adeps lanæ, but he believes it to be dissolved in appreciable quantities.—Arch. internat. de Pharmacod. et de Thérap., 1907, v. 17, p. 463.

Seel, Eugen, describes double salts of phenol and meta- and para-cresol that have been prepared and some of which are being marketed as disinfectants under trade names.—Pharm. Ztg., Berl., 1907, v. 52, pp. 662–663.

Chapman, David Simeon, discusses phenol and related compounds and calls attention to the proportions of the several constituents present in the different compounds.—Proc. North Carolina Pharm. Ass., 1907, p. 69.

Bachman, Gustav, (com. on adulterations) reports phenol ranging from 90 per cent to 87.6 per cent, instead of 96 per cent as required by the U. S. P. These samples were red in color with slight appearance of liquefaction.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

Kline and Graham assert that they have not been able to find a sample with a congealing point from 40° to 42° C., the highest being 39° C.—Proc. Pennsylvania Pharm. Ass., 1907, p. 83.

Hamerton, James, asserts that the present carbolic acid ointment of the Ph. Brit. is objectionable because of its strength and inconsistency and the separation of globules that takes place when the ointment is kept. He gives a formula containing 4 parts by weight of phenol and 2 parts by weight of camphor, which he considers to be an improvement over that now official.—Pharm. J. Lond., 1907, v. 24, p. 55.

An editorial calls attention to the report of Wynter Blyth on the standardization of disinfectants based on the carbolic acid coefficient which consists in a comparison of the disinfectant power of the article with that of phenol.—*Brit. M. J.*, 1907, v. 1, p. 98.

Sollmann and Brown review the literature relating to the use of the sulphates in the treatment of phenol poisoning and conclude from their experiments that the injection of sulphates does not influence the acute phenol poisoning appreciably.—*J. Am. M. Ass.*, 1907, v. 48, pp. 1015-1019.

Wallace, David, records nine cases of carbolic acid gangrene.—*Brit. M. J.*, 1907, v. 1, p. 1110.

Watkins says that carbolic acid not being the exclusive product of any chemical manufactory, nor a specialty of a proprietary firm, has not received the extravagant praises for its virtues that are conferred upon many antiseptics far inferior in effectiveness.—*Eclectic M. J.*, Cincin., 1907, v. 67, p. 267.

Church comments on the return to favor of carbolic, due, he intimates, to its use as a saturated solution in ethyl alcohol instead of water.—*Ibid.*, p. 376.

PENOLPHTHALEIN.

An unsigned article gives an outline history of the introduction of phenolphthalein as a laxative and asserts that its use originated from the consumption of wine in Austria-Hungary, which had been denatured by the addition of this article.—*Brit. & Col. Drug.*, Lond., 1907, v. 52, p. 190.

Schweitzer, Hugo, gives an account of the discovery of the laxative properties of phenolphthalein.—*Am. Druggist*, N. Y., 1907, v. 50, p. 194.

Meyer and Hantzsch discuss the color formations of phenolphthalein and of its esters.—*Ber. d. deutsch. chem. Gesellsch.*, 1907, v. 40, III, pp. 3479-3488.

An answer to a correspondent presents several formulas for phenolphthalein laxative compounds in various forms.—*Am. Druggist*, N. Y., 1907, v. 50, p. 361.

The editor of the Therapeutics column calls attention to the use of phenolphthalein as a purgative under a variety of names, and states that it has no other known physiological action than that of a purgative.—*J. Am. M. Ass.*, 1907, v. 48, p. 1133.

PHENYLIS SALICYLAS.

Seidell, Atherton, contributes a paper on the solubility of salol.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 1088-1091.

Blome, Walter H. (com. on adulterations), reports several lots of salol below standard in color and odor. Some of them developed an

objectionable odor on standing.—Proc. Michigan Pharm. Ass., 1907, p. 70.

The inspectors of pharmacies assert that salol is frequently changed by sulphates, chlorides, or free salicylic acid.—Ann. de pharm., Louvain, 1907, v. 13, p. 329.

Hugenschmidt, A. C., thinks salol should never be used in tooth powders, as he has observed several cases of eczema of the lips which he traced thereto.—Dental Cosmos, Phila., 1907, v. 49, p. 471.

Carle and Pont (Rev. Odontol. Par., Feb., 1907), have collected 5 cases of perilabial eczema due to the same cause.—*Ibid.*, p. 472.

Davis, N. S., asserts that salol and salophen are only useful in mild cases of rheumatism, for they can not be given safely in sufficiently large doses to control severer ones.—Tr. Am. M. Ass., Sec. Pharm. and Therap., 1907, p. 114.

PHOSPHORUS.

Stose, George W., reviews some of the history of phosphorus and its manufacture in the United States.—Chem. Eng., 1907, v. 6, pp. 206–211.

Llewellyn, William G., finds that white phosphorus may be obtained by distilling yellow phosphorus in a current of ammonia gas.—Chem. News, Lond., 1907, v. 96, p. 296.

Lusk, Graham, presents a study on the metabolism in phosphorus poisoning.—Am. J. Physiol., Bost., 1907, v. 19, pp. 461–467.

Flamini, Mario, discusses the action of phosphorus on the metabolism of calcium in normal and rachitic children.—Arch. farmacol. sper. Roma, 1907, v. 6, pp. 653–663.

Clark, B. J., points out that while phosphorus is recognized as a homœopathic remedy for rachitis it is seldom necessary except in cases of early bronchial trouble.—Tr. Am. Inst., Homœop., 1907, 63d session, p. 476.

Blackwood, A. L., points out that phosphorus is indicated where the child is restless, fidgety, can not sit or stand still a moment.—*Ibid.*, 1907, p. 486.

PHYSOSTIGMA.

Windhaus and Hauth (Med. Dept. Univ. Lab., Freiburg i. B. Ber. 39, pp. 4378–4384) report experiments on Calabar beans and describes a new phytosterol which they termed *stigmasterol*.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1002.

Patch, E. L., found calabar bean extract with U. S. P. alkaloidal strength. It may be pasty, not in powder; dependent upon the amount of fixed oil present. No provision is made for its removal.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

PHYSOSTIGMINÆ SALICYLAS.

Winterberg, Heinrich, reports experiments to determine the action of physostigmine on the heart of warm-blooded animals and presents his conclusions.—*Ztschr. f. exper. Path. u. Therap.*, 1907, v. 4, pp. 636-657.

Unger, Moritz (*Pflügers Archiv*, v. 119, pp. 373-403), presents a study of the action of atropine and physostigmine on the intestine of the cat.—*Jahresb. ü. Tier Chem.*, Wiesb., 1907, v. 37, p. 777.

Posey, William Campbell, asserts that the best myotics for the purpose are eserine salicylate (physostigmine salicylate) and pilocarpine nitrate.—*J. Am. M. Ass.*, 1907, v. 48, pp. 676-680.

Koontz, F. L., states that physostigmine salicylate hypodermically is by far the most potent remedy we have at present for the treatment of adynamic ileus.—*N. York. M. J.*, 1907, v. 86, p. 597.

Additional references on the use of physostigmine will be found in the *Index Medicus* and the *J. Am. M. Ass.*

PHYTOLACCA.

Henkel, Alice, describes and figures *Phytolacca decandra* L., commonly known as poke, pigeon berry, garget, scoke, pocan, coakum, Virginian poke, inkberry, red inkberry, American nightshade, cancer-jalap, and redweed.—*Bul. Bur. Plant Ind.*, U. S. Dept. Agric., 1907, No. 107, pp. 29-30.

Holm, Theo., describes and figures *Phytolacca decandra* L.; also describes the microscopical structure of several portions of the plant.—*Merck's Report*, N. Y., 1907, v. 16, p. 312.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of pokerooroot as 48.9, 48, 45, 55, and 40 per cent, respectively.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 319.

PILOCARPINÆ HYDROCHLORIDUM.

Riedel's *Berichte* (Berlin, 1907, p. 66) discusses the production of pilocarpine picrate and the possibility of using the melting point of this compound as a test for identifying the alkaloid.

Thurston, Azor, asserts that pilocarpine nitrate is dextrogyrate in aqueous or alcoholic solutions.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

Reichard, C., discusses the properties and the characteristic reactions of pilocarpine.—*Pharm. Zentralh.*, 1907, v. 48, pp. 417-424.

Patch, E. L., states that the distinctive test with hydrogen dioxide and potassium dichromate has been pronounced unsatisfactory.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 329.

Langrand, A., reports on pilocarpine hydrochloride adulterated to the extent of 25 per cent with sulphonah.—*J. de pharm. et de chim., Par.*, 1907, v. 26, pp. 97-99.

Southall's Report (1907, 27) notes that not one specimen of this salt has been met with melting point at 176°-178° C. Out of 12 samples the best melted at 170° C., another possessing a melting point as low as 158° C.—*Year Book of Pharmacy, Lond.*, 1907, p. 127.

Zeri, Agenore, discusses the cholagogue action of pilocarpine, giving the protocols of his experiments on two patients.—*Arch. farmacol. sper. Roma*, 1907, v. 6, pp. 35-56.

Robinson, W. J., discusses the use of pilocarpine as an adjuvant in the treatment of syphilis. He concludes that pilocarpine is a most remarkable glandular eliminant, and glandular elimination is one of the most important factors in the successful treatment of syphilis.—*Med. Rev., N. Y.*, 1907, v. 71, pp. 988-989.

Additional references on the use of pilocarpine will be found in the *Index Medicus* and the *J. Am. M. Ass.*

PILOCARPUS.

Puckner, W. A., calls attention to several communications on the assay of pilocarpus appearing in the literature of 1906.—*Pharm. Rev., Milwaukee*, 1907, v. 25, p. 330.

Matthes and Rammstedt discuss the estimation of pilocarpine by means of picrolonic acid. The results are slightly higher than the corresponding results of assays made by G. Fromme.—*Arch. d. Pharm.*, 1907, v. 245, p. 131.

Cæsar and Loretz (*Geschäfts Ber.*, 1907, p. 93) discuss the assay of pilocarpus and suggest the desirability of determining the moisture content of the drug as well as the pilocarpine content.

Perrot, E., notes that there are two commercial varieties of jaborandi; *P. microphyllus*, very active, to which are added the leaves of an exotic legumen, *Swartzia decipiens*; in certain samples he has found 30 per cent of the leaves of this plant.—*Bull. d. sc. pharmacol. Par.*, 1907, v. 14, p. 348.

Gane, E. H., examined two samples of the black jaborandi assaying 0.108 and 0.05 per cent alkaloids.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 326.

Vanderkleed, Charles E., reports four assays of jaborandi leaf ranging from 0.240 to 1.140 per cent alkaloids. He points out that the quality varies greatly.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 89.

Dodge, J. D., discusses the physiological action and therapeutic applications of jaborandi.—*Eclectic M. J. Cincin.*, 1907, v. 67, pp. 127-133.

PILULÆ.

Beringer, George M., points out that the N. F. introductory notes to the section on pills do not correspond with the product or the practices of manufacturers.—*Am. J. Pharm., Phila.*, 1907, v. 79, p. 361.

Brown, J. F., recommends the use of a mixture of equal weights of glycerin of tragacanth and manna beaten together as an excipient for metallic and insoluble salts, and asserts that it is free from the excessive elasticity of the former when used alone.—*Pharm. J. Lond.*, 1907, v. 25, p. 373.

Carles, M. P., (*Répert. de Pharm.*, 1907, p. 348) discusses the use of manna as an excipient for pills.—*Schweiz. Wehnschr. f. Chem. u. Pharm., Zürich*, 1907, v. 45, p. 553.

For a discussion of pill excipients see *Répert. de pharm., Par.* 1907, v. 19, Astruc and Cambe, p. 111; Carles, P., p. 348; Manseau, pp. 440-441. Carles, p. 492.

An unsigned article discusses the extemporaneous making of pills, presents some guiding principles, and discusses the excipient to be used; also outlines some rules to be observed.—*Pharm. J. Lond.*, 1907, v. 24, pp. 746-747, 804-805, 834-835.

Rieben, Ernst, discusses the disintegration of pills in the gastrointestinal canal, and records a number of experiments with pills of varying composition, using potassium iodide as the active ingredient.—*Arch. d. Pharm.*, 1907, v. 245, pp. 502-517.

Runge, Paul, discusses the preparation of keratin-coated pills.—*Pharm. Ztg.*, 1907, v. 52, p. 555.

PILULÆ ANTIMONII COMPOSITÆ U. S. P., 1890.

Sawyer, J., discusses the report of the committee of reference in pharmacy to the General Medical Council on the Ph. Brit. and points out that the recommendation to omit the castor oil in Plummer's pill is not a desirable one in that it would leave alcohol as the only liquid excipient remaining in the mixture.—*Pharm. J. Lond.*, 1907, v. 24, pp. 3-4.

Brown, Alcock, and Ashton comment on the criticisms made by Sawyer in regard to the proposed omission of castor oil from the compound pill of antimony.—*Ibid.*, v. 24, p. 48.

PILULÆ ANTINEURALGICÆ N. F.

Caldwell, Paul, says that each Gross' antineuralgic pill contains one-twentieth grain of morphine sulphate.—*Drug. Circ., N. Y.*, 1907, v. 51, p. 205.

Also points out that each Brown-Sequard's antineuralgic pill contains one-half grain of extract of opium and one-fourth grain of extract of cannabis indica.—*Ibid.*, v. 51, p. 205.

PILULÆ FERRI CARBONATIS.

Hirschfeld, Hans, in discussing the treatment of anæmia points out that the untoward results that have been observed in connection with the pills of carbonate of iron are to be traced to the readiness with which these pills are decomposed. He insists that these pills should always be directed freshly prepared.—*Therap. d. Gegenw.*, Berl., 1907, v. 48, p. 79.

Baird, J. W., (com. on adulterations) reports 1 sample adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

PILULÆ OPII ET CAMPHORÆ.

Caldwell, Paul, points out that each pill of opium and camphor contains 1 grain of powdered opium.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 205.

PILULÆ OPII ET PLUMBI.

Caldwell, Paul, points out that each pill of opium and lead contains 1 grain of powdered opium.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 205.

PIPER.

Härtel and Weil discuss the examination and the valuation of pepper, and present a number of general conclusions on the factors indicating the value of pepper.—*Ztschr. f. Unters. d. Nahr. u. Genussm.*, 1907, v. 14, pp. 567–579.

Fincke, H., reports that determinations of pure cellulose, lignin, and cutin of pepper show that not half of the so-called crude fiber of the substances examined consists of cellulose.—*Ibid.*, v. 13, pp. 265–266.

Surie, J. S., reports an examination of samples of adulterated pepper, microscopically and chemically. One sample contained as much as 11.7 per cent of ash, in place of 5 per cent the maximum ash of good black pepper.—*Pharm. Weekbl.*, 1907, v. 44, pp. 447–448.

Judd, Albert F., found the ash in 10 samples of powdered black pepper to vary from 6.3 to 12.9 per cent.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 260.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 74) reports that 9 samples of pepper examined varied from 3.41 to 6.26 per cent of ash.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, pp. 36–37) found the ash of eight samples of white pepper ranging from 0.76 to 1.08 per cent and the alcoholic extract from 8.95 to 10.5 per cent. Two samples of black pepper yielded 3.95 and 5.06 per cent of ash, 10.8 and 12.25 per cent of alcoholic extract, respectively, being obtained.

PLUMBI ACETAS.

Westerkamp, Arthur, discusses the electrolytic estimation of lead in tin-lead amalgams and similar mixtures.—Arch. d. Pharm., 1907, v. 245, pp. 132–139.

Klose, G., reports that adeps lanæ dissolves approximately 1.09 per cent of lead acetate at 45° C.—Arch. internat. de Pharmacod. et de Thérap., 1907, v. 17, p. 462.

Patch, E. L., reports that purified granular plumbi acetate frequently contains excess of carbonate.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 329.

Caspari, Chas. E., (com. on adulterations) examined 7 samples, 4 satisfactory; 3 contained excess carbonate.—Proc. Missouri Pharm. Ass., 1907, p. 143.

Blome, Walter H., (com. on adulterations) reports on lead acetate; excess of carbonate; iron also present.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 31) detected heavy contamination with metallic lead in 3 samples of litharge.

Dauwe, O., makes a contribution to the experimental study of acute saturnism, the neutralizing power of sodium sulphate, etc.—Arch. internat. de Pharmacod., et Thérap., 1907, v. 17, pp. 387–443.

PLUMBI OXIDUM.

Partheil, A., discusses the composition and the examination of commercial lead oxides.—Arch. d. Pharm., 1907, v. 245, pp. 519–528, 683.

Böttger, W., discusses the quantitative estimation of lead as lead oxalate and concludes that the precipitation of the lead ion as oxalate offers the advantage that the precipitate may be determined titrimetrically by means of potassium permanganate.—Pharm. Post, Wien, 1907, v. 40, p. 679.

Pieszczyk, Ernst, outlines a method for testing lead oxide which depends on the reduction of lead peroxide to lead oxide in the presence of hydrogen dioxide and nitric acid.—Pharm. Ztg., Berl., 1907, v. 52, p. 922.

Partheil, A. discusses the testing of lead oxide. He points out that the determination of the insoluble residue according to the method prescribed by the Ph. Germ. IV, is impracticable because of the precipitate caused in the lead nitrate solution by oxalic acid. In place of the latter he recommends lactic acid and records a number of experiments.—Chem. Ztg., 1907, v. 31, p. 941.

Blome, Walter H., (com. on adulterations) reports examining lead oxide. Impurities found, silica, barium, sulphate, iron, and alumi-

num. 0.2 per cent of impurities is allowed. One sample contained 0.62 per cent.—Proc. Michigan Pharm. Ass., 1907, p. 69.

Kinyon, C. B., points out that plumbum, like platina, has a great influence over the disorders of the mind, and is indicated by: Great melancholy, a feeling as though she would be paralyzed. A tendency to epilepsy. During the change of life. No appetite but violent thirst at times.—Tr. Am. Inst., Homœop., 1907, v. 63rd. session, p. 390.

PODOPHYLLUM.

Holm, Theo., describes and figures *Podophyllum peltatum*, L., including the microscopical structure of the several portions of the plant.—Merck's Report, N. Y., 1907, v. 6, pp. 250–253.

Henkel, Alice, describes and figures *Podophyllum peltatum* L., also called May apple, mandrake, wild mandrake, American mandrake, wild lemon, ground lemon, hog apple, devil's apple, Indian apple, raccoon berry, duck's foot, umbrella plant, and vegetable calomel.—Bul. Bur. Plant. Ind., U. S. Dept. Agric., 1907, No. 107, pp. 39–40.

Vanderkleed, Charles E., reports 6 assays of mandrake root ranging from 3.140 to 4.240 per cent. He asserts that the standard of 4.00 per cent is difficult to maintain.—Proc. Pennsylvania Pharm. Ass., 1907, p. 89.

POTASSII ACETAS.

Troxell, H. L., (com. on adulterations) says that in the test of the U. S. P. which calls for dry salt, the process of drying should be specified more clearly if possible. In order to obtain a perfectly dry salt, in this case it is not only necessary to heat for several hours, but it must be stirred frequently and the particles broken up. A perfectly dried salt will yield on further ignition the required percentage, if pure.—Proc. Maryland Pharm. Ass., 1907, p. 87.

Blome, Walter H., (com. on adulterations) reports the examination of several samples of potassium acetate: Chloride was found in two, one was acid in reaction, and another contained sulphate.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Bachman, G., (com. on adulterations) reports potassium acetate ranging from 97.41 per cent to 90.1 per cent instead of 98 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 40.

The inspectors of pharmacies found potassium acetate that had become liquified and suggest that this substance should be preserved in a desiccator. It was also found partially altered by chlorides and sulphates.—Ann. de Pharm., Louvain, 1907, v. 13, p. 324.

POTASSII BICARBONAS.

Bachman, Gustav, (com. on adulterations) examined potassium bicarbonate varying from 99 to 94.22 per cent instead of 99 per cent, as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 40.

Patch, E. L., examined 4 samples ranging from 99.51 per cent to 99.76 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 330.

POTASSII BITARTRAS.

A report from Consul-General Robert P. Skinner, of Marseilles, contains considerable information concerning exports of argols and wine lees from France. He asserts that French argols yield a whiter cream of tartar than the raw material from any other country. The ordinary commercial classifications of the merchandise are: Brown argols, containing about 80 per cent of bitartrate of potash; red argols, containing 70 per cent; and wine lees, containing 30 per cent.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, July 15, p. 28D.

Murray, Benjamin L., points out that silica may interfere with the test for alum and phosphates in potassium bitartrate. He suggests the use of a platinum dish instead of porcelain.—Merck's Report, N. Y., 1907, v. 16, p. 248.

Carles, P., states that chemists engaged in the cream of tartar industry usually employ as a standard for setting the volumetric alkaline solutions a potassium bitartrate of high grade, containing 99 per cent of $\text{KHC}_4\text{H}_4\text{O}_6$ purified from $\text{CaC}_4\text{H}_4\text{O}_6$ by digestion in dilute HCl.—J. de pharm. et de chim., Par., 1907, v. 25, pp. 333-335.

Havenhill, L. D., reports an examination on 28 samples obtained from grocers. Thirteen consisted almost entirely of substitutes, but were all sold at full price. Adulterants were acid calcium phosphate, calcium sulphate, etc. Samples from druggists were all pure.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 325.

Scoville, W. L., examined 1 sample, grocer's product, which contained 3 ounces cream of tartar, $5\frac{1}{2}$ ounces tartaric acid, $3\frac{1}{2}$ ounces starch, 4 ounces calcium sulphate.—*Ibid.*, v. 55, p. 325.

Blome, Walter H., (com. on adulterations) reports potassium bitartrate having a trace of aluminum.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Bachman, Gustav, (com. on adulterations) reports potassium bitartrate ranging from 98.5 per cent to 90.48 per cent, instead of 99 per cent, as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 40.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 21) say that the influence of appreciable contamination of calcium sulphate upon the ignition method of estimating the potassium bitar-

trate was recently brought under their notice. When dissolving the ash the potassium carbonate appears to react with the calcium sulphate, and calcium carbonate being deposited, the alkalinity of the solution becomes proportionately diminished.

An editorial calls attention to the report of A. W. J. MacFadden to the local government board, which showed the presence of notable amounts of lead and arsenic in many specimens of the imported citric and tartaric acid and cream of tartar.—*Brit. M. J.*, 1907, v. 1, p. 1139.

The annual report of the local government board for England and Wales points out that of a total of 272 samples of cream of tartar examined 13 were found to be adulterated or not up to standard.—*Chem. & Drug.*, Lond., 1907, v. 71, p. 828.

The inspectors of pharmacies assert that many samples of cream of tartar contain calcium tartrate and some calcium sulphate.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 326.

POTASSII BROMIDUM.

Lami, Pio, presents a study on the solubility of potassium bromide in water and points out that a saturated solution at 15° C. contains approximately 50 gms. of the salt in 100 cc. of the solution.—*Boll. chim. farm.*, Milano, 1907, v. 46, pp. 457-469.

Hankey, William T., reports examining potassium bromide which tested 83.9 per cent potassium bromide and 16.1 per cent sodium chloride and carbonate. The alkalinity was 5 times that allowed by the U. S. P.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 86.

Caspari, Chas. E., (com. on adulterations) examined 18 samples, 14 satisfactory; 4 contained excess of chloride.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

The N. Y. State Board of Health, Eastern Branch, reports 13 samples examined. Two deficient.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 330.

Patch, E. L., examined 10 lots U. S. P.—*Ibid.*, v. 55, p. 330.

Diekman, Geo. C., asserts that 75 per cent of the potassium bromide on the market is below U. S. P. requirements.—*Proc. New York Pharm. Ass.*, 1907, p. 102.

Mossler, Gustav, examined 5 samples of potassium bromide and found one containing an excess of chloride.—*Ztschr. d. allg. österr. Apoth. Ver.*, Wien, 1907, v. 45, p. 37.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 85) recommends the use of a larger proportion of potassium bromide for analyses, and points out that the comparative error is thereby reduced.

Nageotte (*Gaz. des Maladies Infantiles et d'Obstét.*, Par., v. 9) describes certain types of epilepsy which yield to treatment with the bromides.—*J. Am. M. Ass.*, 1907, v. 48, p. 1639.

POTASSII CARBONAS.

Havenhill, L. D., reports on a number of samples of potassium carbonate, and points out that while these samples comply with the official requirements they do not correspond to the chemical formula as given in the Pharmacopœia or the description that is given. He suggests that either the requirements be changed to correspond with the description or that the latter and the chemical formula be changed to comply with the material now available and which corresponds to the 1880 description calling for a salt having the composition $K_2CO_3, 3H_2O$.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 206.

Patch, E. L., examined different samples, which contained much dirt, others trace of iron and chloride. Average to assay 98 per cent.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 330.

Bachman, Gustav, (com. on adulterations) reports potassium carbonate ranging from 97.46 per cent to 90.58 per cent instead of 98 per cent as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 40.

The inspectors of pharmacies found potassium carbonate containing alum, chalk, and silica.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 326.

Mossler, Gustav, examined 9 samples of potassium carbonate and found 2 containing thiosulphate, 1 sample contained traces of iron, and 2 chloride.—*Ztschr. d. allg. österr. Apoth. Ver.*, Wien, 1907, v. 45, p. 37.

Kinyon, C. B., points out that "Kali carb" was frequently used by the earlier practitioners in place of pulsatilla, with marvelous results in many cases. If given faithfully it will frequently reestablish the menstrual function and bring about a very satisfactory degree of health.—*Tr. Am. Inst., Homœop.*, 1907, 63d session, p. 387.

POTASSII CHLORAS.

Betts and Sherry detail some experiments on the manufacture of chlorates and hypochlorites with a view to high-current efficiency.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 340-345.

An unsigned article discusses the dangerous nature of potassium chlorate and points out that the presence of the lower oxides of chlorine materially enhances the danger.—*Pharm. Ztg.*, Berl., 1907, v. 52, p. 147.

Luther and Rutter discuss the iodometric determination of chlorates and outline a process which they believe to be practicable.—*Ztschr. f. anal. Chem. Wiesb.*, 1907, v. 46, pp. 521-522.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907-8, p. 38) tested 17 lots, 4 of which were found to contain marked amounts of H_2S metals. Estimated colorimetrically (as lead) the quantity in these amounted to about 40 parts per million.

The contributor of the "Vienna letter" relates the circumstances of a fatal case of poisoning with potassium chlorate. The amount taken was small, suggesting a peculiar idiosyncrasy toward the drug.—J. Am. M. Ass., 1907, v. 49, p. 1930.

An abstract from the Lancet of October 26 reports a fatal case of poisoning by potassium chlorate, the patient having taken 20 gms. of the salt.—Pharm. J., Lond., 1907, v. 25, p. 588.

Pinneo, Frank W., is reported to have said that the use of potassium chlorate as a throat wash would prevent many of the complications in middle ear infection of scarlet fever.—N. York M. J., 1907, v. 86, p. 184.

POTASSII CITRAS.

Patch, E. L., examined 12 lots; 2 contained excess of heavy metals, 1 was excessively acid.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 330.

Gilmour, J. P., reports 18 samples examined as of Ph. Brit. standard; he finds this salt "rarely neutral; invariably (*sic.*) acid or alkaline." Year Book of Pharmacy, Lond., 1907, pp. 446-455.

POTASSII DICHROMAS.

Gossage and Bernstein describe the symptoms of poisoning observed in a man who took about 72 grains of potassium dichromate, and died about the ninth day despite treatment.—Lancet, Lond., 1907, v. 173, p. 1758.

Littlejohn, Harvey, (Univ. of Edinburgh. Edinburgh Med. J., 22, 235-239) reports a case of fatal poisoning with bichromate of potassium.—Chem. Abstr. Am. Chem. Soc., 1908, v. 2, p. 550.

Raue, C. Sigmund, points out that "Kali bichromicum" is particularly useful for the catarrhal conditions encountered in syphilis, and that it, like "Kali hydriodicum" follows well after mercury.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 526.

POTASSII ET SODII TARTRAS.

MacFadden, A. W. J., reports on 15 samples of cream of tartar of foreign origin; only 1 of these samples examined exceeded the limit of arsenic, and 11 samples were free from arsenic. The home-manufactured samples of tartaric acid and cream of tartar gave a percentage of lead which in no case exceeded 0.002 per cent, and all were found to be free from arsenic. Pharm. J. Lond., 1907, v. 24, p. 554.

POTASSII FERROCYANIDUM.

Karslake, William Jay, describes a method of preparing potassium ferricyanide from potassium ferrocyanide by using a dilute aqueous solution of potassium permanganate without the addition of any acid whatever.—Am. Chem. J. 1907, v. 37, p. 637.

POTASSII HYDROXIDUM.

Bachman, Gustav, (com. on adulterations) reports potassium hydroxide ranging from 86.65 per cent to 81.30 per cent, instead of 85 per cent as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 40.

Patch, E. L., examined 6 samples assaying from 84.04 per cent to 86.64 per cent; 2 contained large excess of chlorides.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 330.

POTASSII IODIDUM.

Mitchell, Edward, asserts that potassium iodide is not the least among the troubles of the wholesale druggist. An excess of iodate causes them to decline quite a liberal proportion of stock shipped. His firm rejected in one year 3,000 pounds of this item.—*Proc. Arkansas Pharm. Ass.*, 1907, p. 90.

Riegler, E., discusses a new method for the estimation of iodides in the presence of bromides and chlorides which depends on the oxidation of the iodide in alkaline solution, with potassium permanganate and the subsequent treatment of the resulting iodate with hydrazinsulphate.—*Ztschr. f. anal. Chem.*, 1907, v. 46, pp. 315–318.

Rupp and Kost outline a method for the determination of potassium iodide in ointments, which they say is superior to the argentometric method in that it is not affected by the presence of chlorine or bromine. It is based upon the fact that iodine is liberated in acid permanganate solution and titrated with thiosulphate after decomposing the excess of permanganate with oxalic acid.—*Pharm. J. Lond.*, 1907, v. 24, p. 695.

Jones, Lindsay, and Carroll discuss the conductivity of certain salts in mixed solutions and report a number of experiments on the conductivity of potassium iodide in water, alcohol, methyl alcohol, and in mixtures of these solvents.—*Ztschr. d. physik. Chem.*, 1907, v. 56, pp. 129–178.

Lami, Pio, asserts that a saturated, aqueous solution of potassium iodide, at 15° C., contains approximately 133.3 gms. of salt in 100 cc. of the solution.—*Boll. chim. farm. Milano*, 1907, v. 46, p. 457.

Kremann and Kerschbaum discuss the solubility of potassium iodide in water and of water in potassium iodide at low temperature.—*Ztsch. f. anorg. Chem.*, 1907, v. 56, 218–229.

Klose, G., found that potassium iodide was practically insoluble in water free adepis lanæ, but that a hydrated wool fat will dissolve approximately 42 per cent of potassium iodide. with partial decomposition of the salt, resulting in a distinctly brown coloration of the resulting mixture.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, p. 462.

Caspari, Chas. E., (com. on adulterations) examined 103 samples, 69 satisfactory; 14 contained excess alkali; 20 contained iodate.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

Bachman, Gustav, (com. on adulterations) reports potassium iodide ranging from 99 per cent to 97.3 per cent, instead of 99 per cent, as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 40.

Patch, E. L., examined 15 lots, U. S. P. quality.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 330.

Blome, Walter H., (com. on adulterations) reports on 5 samples of potassium iodide; 2 contained excess of chloride and bromide; 1 contained iron; 2 contained thiosulphate.—*Proc. Michigan Pharm. Ass.*, 1907, p. 70.

The inspectors of pharmacies found samples of potassium iodide that were excessively alkaline, and other samples, because of careless handling, partially decomposed and quite yellow.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 328.

Abderhalden and Krauttsch report a comparative study of the elimination of iodine after the administration of potassium iodide and of sajodin.—*Ztschr. f. exper. Path. u. Therap.*, 1907, v. 4, pp. 716-719.

Hedinger and Loeb discuss the structural changes in the aorta of rabbits following subcutaneous injections of potassium iodide.—*Arch. f. exper. Path. u. Pharmacol. Leipz.*, 1907, v. 56, pp. 314-319.

Landis, H. R. M., discusses the use of potassium iodide in pulmonary tuberculosis for diagnostic purposes.—*Therap. Gaz.*, Detroit, 1907, v. 31, pp. 235-238.

Aronstam, N. E., is quoted by the contributor of a note to the effect that potassium iodide may at times produce an angioneurotic edema of the face and eyes, but this may be avoided by combining it with tincture of belladonna or hyoscyamus.—*J. Am. M. Ass.*, 1907, v. 49, p. 953.

Suszmán, M., reports the occurrence of iodism after the use of several of the newer iodine compounds, for at least one of which it is claimed that it does not cause iodism.—*Therap. de Gegenw.*, 1907, v. 48, p. 144.

Raue, C. Sigmund, asserts that in the later manifestations of hereditary syphilis the iodide of potash must frequently be employed in material doses. Whether this shall be 5, 10, or even 20 grains three times daily rests entirely with the judgment of the physician.—*Tr. Am. Inst. Homœop.*, 1907, 63rd session, p. 527.

Additional references on the use of potassium iodide will be found in the *Index Medicus* and the *J. Am. M. Ass.*

POTASSII NITRAS.

Murmann, Ernst, reports experiments to determine the formation of potassium nitrate in the soil, and the influence of lime and magnesia on the available nitrate.—*Oesterr. Chem. Ztg.*, Wien, 1907, v. 10, p. 181.

Caspari, Chas. E., (com. on adulterations) examined 14 samples, 13 satisfactory; 1 contained .12 per cent sodium chloride.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

van der Harst, J. C., reports on a sample of potassium nitrate containing chlorate.—*Pharm. Weekbl.*, 1907, v. 44, p. 1506.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 38) report that the impurities most frequently found in this article were arsenium, chloride, and chlorate. Six parts of arsenium per million was the highest recorded figure, whilst chloric acid occurred several times in appreciable quantity.

POTASSII PERMANGANAS.

Warden, Edward C., reports some observations on the solubility of potassium permanganate, and presents the results of experiments in the form of tables. He finds that at 15° C. 100 parts of water will dissolve 5.4 parts of permanganate.—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, pp. 452-453.

Hammer, J. W., (*Svensk Farmaceutisk Tidskrit*, 1907, pp. 221-224) finds that solution of permanganate, in the absence of organic matter, will keep indefinitely. From his investigations it would appear that an aged solution of permanganate is more reliable than one freshly prepared.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 841.

An unsigned article discusses the preparation of permanganates other than those of potassium and sodium by means of the electric current.—*Oil, Paint and Drug Reporter*, New York, 1907, v. 72, July 15, p. 52.

Bachman, Gustav, (com. on adulterations) reports potassium permanganate ranging from 96.2 per cent to 82.5 per cent instead of 99 per cent as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 40.

Troxell, H. L., (com. on adulterations) found some samples deficient in strength and purity.—*Proc. Maryland Pharm. Ass.*, 1907, p. 87.

An editorial discusses some of the widely varying opinions on the use of potassium permanganate in the treatment of snake bites.—*Med. Rec. N. Y.*, 1907, v. 72, p. 190.

Braddock, Charles S., states he used potassium permanganate in the treatment of snake bites, injecting a solution into the wound and into the tissue about the wound.—*N. York M. J.*, 1907, v. 86, p. 885.

An editorial reply to a query states that potassium permanganate destroys about its own weight of snake venom, and the method of Brunton and Fayrer of rubbing the permanganate into a wound after tying the limb above the bite constitutes a good method of treating snake bite. Haw, W. H., suggests the freezing of the part with ethyl chloride before the use of the permanganate.—J. Am. M. Ass., 1907, v. 49, p. 1130.

Additional references on the use of potassium permanganate will be found in the Index Medicus and the J. Am. M. Ass.

PRUNUS VIRGINIANA.

Francis, John M., has seen many samples of wild cherry bark which had been gathered at an improper season or which were obtained from the improper part of the tree.—Proc. Pennsylvania Pharm. Ass., 1907, p. 62.

An unsigned article quotes Stevens, Caldwell, and 3 manufacturers as giving the percentage of alcohol in the official fluid extract of wild cherry as 75.9, 19, 18, 35, and 10 per cent, respectively.—Drug Circ., N. Y., 1907, v. 51, p. 319.

Buckner, J. C., reviews the literature relating to syrup of wild cherry, and concludes that the formula offered by Cline is perhaps the best. This method provides for the addition of the glycerin to the percolate, and the syrup so prepared is said to keep well and to be more nearly what the average person expects to see as syrup of wild cherry.—Proc. Texas Pharm. Ass., 1907, pp. 77–80.

Benfield, in discussing the syrup of wild cherry, asserts that a better color and a more stable product could be made by mixing 50 cc. of glycerin with the water used for maceration of the drug, leaving the remaining 100 cc. to be mixed with the percolate. He also found that to make a syrup that would keep, the amount of sugar should be increased to 750 gms.—Bull. Am. Pharm. Ass., Chicago, 1907, v. 2, pp. 121, 122.

PULVIS EFFERVESCENS COMPOSITUS.

Patch, E. L., examined 200 barrels which contained traces of chloride and traces of sulphate; several, traces of iron; ten not thoroughly mixed. Samples from different portions of the barrels assayed differently; otherwise were U. S. P. Sample of Seidlitz powders, mixture contained 45.88 per cent of sodium bicarbonate instead of 25.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 330.

QUASSIA.

Quant, Ernest, reports as the result of his experiments that the present cold infusion of quassia keeps better than one made with boiling water, but that the present infusion would be improved in

its keeping properties if to the present official directions were added instructions "to boil for a few minutes and allow to cool."—Year Book Pharm., Lond., 1907, pp. 446–455. (See also Pharm. J., Lond., 1907, v. 25, p. 111.)

The editor of "Therapeutical Notes" states that the simple bitters stimulate the gastric and the pancreatic secretions in gastric hyposthenia. G. Bardet, (Bulletin général de thérapeutique, March 30, 1907) places quassia at the head of the list of simple bitters.—N. York M. J., 1907, v. 85, p. 842.

Ramseyer, A. A., quotes Rademacher as to the wonderful efficacy of quassia in liver diseases.—Eclectic M. J. Cincin., 1907, v. 67, pp. 340–342.

QUININA.

The British report of Java on the quinine industry during the year 1906, asserts that the quantity of sulphate of quinine disposed of at auction, and by private sales in Batavia, by the Bandoeng Quinine Factory during the year 1906, amounted to 916,561 ounces, as against 534,400 ounces in 1905.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, July 22, p. 51.

An editorial discusses the outlook of quinine and reviews the economic conditions prevailing in the quinine market.—Pharm. J. Lond., 1907, v. 24, p. 22.

Consul-General W. H. Michael, of Calcutta, reports that the output of the quinine factory located in British Sikkim was 18,717 pounds 4 ounces, which is less by 2,897 pounds 8 ounces than the product of last year. This decrease was due to the low per cent of quinine sulphate in the bark.—Oil, Paint and Drug Reporter, New York, 1907, v. 72, September 23, p. 16.

An editorial calls attention to the fact that the government of India uses quinine colored pink, to distinguish it from the commercial article commonly sold in the bazaars.—Pharm. J. Lond., 1907, v. 25, p. 332.

An editorial calls attention to the steady decrease in the price of quinine during the past quarter of a century, and points out some of the causes for this decrease in price.—*Ibid.*, v. 24, p. 688.

Larrouturon, J., reports a series of studies on the fluorescence of quinine and its various salts. He classifies salts of quinine into 4 groups:

1. Salts without action on fluorescence.
2. Salts developing fluorescence.
3. Salts extinguishing fluorescence.
4. Salts having a mixed action on fluorescence.—Bull. de la Soc. de pharm. de Bordeaux, 1907, v. 47, pp. 129–140; 169–181; 210–222; 238–246; 262–272; 298–305; 332–339.

Abensour, J., proposes a modification of André's process which, he says, will permit the recognition of very small traces of quinine (1 milligramme in a litre of water).—*J. de pharm. et de chim.*, 1907, v. 26, p. 25.

Larrouturron, J., (*Zeit. Allgem. österr. Apothek. Ver.*, 13, March 30, 1907) points out that the statement that quinine in aqueous solution is neutral to phenolphthalein is erroneous. Chemically pure quinine reacts alkaline toward phenolphthalein; the "pure" quinine of commerce often contains traces of basic sulphate, which, like all quinine salts, has an acid reaction toward phenolphthalein.—*Pharm. J. Lond.*, 1907, v. 24, p. 433.

Flury, Ferdinand, reviews some of the recent literature relating to quinine and the properties of certain quinine salts.—*Ztschr. f. ang. Chem.*, Berl., 1907, v. 20, p. 619.

Dulière, Walter, discusses the thaleioquin test as an available approximate test for determining the percentage of quinine in cinchona bark.—*Ann. de pharm.*, Louvain, 1907, v. 13, pp. 49–50.

Christensen, A., discusses the approximate determination of quinine in pharmaceutical preparations by means of S. M. Jorgensen's reagent.—*Arch. f. Pharm. og. chem.*, Copenhagen, 1907, v. 14, pp. 17–20.

Schultze, Louis, points out that solutions of various alkaloids of chloroform, especially those of quinine, have been found to require less acid for neutralization than they should, due to the decomposition of the chloroform with the production of hydrochloric acid. Solutions of alkaloids in chloroform or ether-chloroform should be distilled as quickly as possible after the shaking-out process.—*Proc. Maryland Pharm. Ass.*, 1907, p. 47.

Madsen, Høst, (*Ber. d. V. Pharm. Ges.*, 1906, No. 9) in view of the failure of the herapathite reaction, as usually carried out by the original directions of Autenrieth, to give reliable results, recommends the following method, which yields uniformly accurate results: The reagent is prepared by dissolving 1 part of iodine in 1 part of 50 per cent of hydriodic acid, 0.8 part of sulphuric acid, and 50 parts of 70 per cent alcohol. If a few drops of this reagent are added to an alcoholic solution of quinine herapathite crystals of the required composition will separate on standing for a short time. The reagent may conveniently be kept in stock.—*Proc. Am. Pharm. Asso.*, 1907, v. 55, p. 924.

Reichard, C., outlines several new reactions for quinine and points out that several of the naturally occurring bases appear to have a tendency to produce certain color effects. Thus opium alkaloids give predominantly yellow reactions, while cinchona alkaloids, more frequently at least, produce green reactions.—*Suedd. Apoth. Ztg.* 1907, v. 47, pp. 26–27.

Warren and Weiss discuss the use of picrolonic acid as a precipitant for quinine, also describe and figure quinine picrolonate.—*Journ. Biol. Chem.*, N. Y., 1907, v. 3, p. 337.

Thurston, Azor, asserts that quinine sulphate is lævorotatory in aqueous or alcoholic solutions.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

Murray, Benjamin L., in discussing the official tests for quinine salts, points out that the descriptions for the alkaloid, bisulphate, hydrochloride, and hydrobromide are very loose on several points which he enumerates.—*Ibid.*, v. 16, p. 247.

Dohme and Englehardt state that they have experienced very little difficulty in obtaining quinine and its salts with the purity required by the U. S. P., but they point out that the amount of 7 cc. of a 10 per cent ammonia water as allowed by the U. S. P. for redissolving the other cinchona alkaloids in the Kerner's test is entirely too large.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 380–381.

Troxell, H. L. (com. on adulterations), asserts that, as the Revised United States Pharmacopœia allows 7 cc. of ammonia water in the tests for other cinchona alkaloids, it is not difficult to obtain these preparations of required purity, although some samples were found not to answer this very lenient test.—*Proc. Maryland Pharm. Ass.*, 1907, p. 87.

An abstract asserts that the free base quinine is being used as a substitute for quinine tannate and euquinine. The alkaloid is free from taste, and, although only slightly soluble in water, is absorbed with remarkable rapidity and completeness.—*Pharm. J.*, Lond., 1907, v. 25, p. 588.

Grosser, Paul, discusses the retention of quinine in the organism. He suggests that the liver has the function of decomposing quinine, but when overpowered by malaria, so that the quinine is no longer destroyed, the latter may act toxically.—*Biochem. Ztschr. Berl.*, 1907, v. 8, pp. 98–117.

Giemsa and Schaumann (*Arch. f. Schiff. u. Tropenhyg.* 11, Beiheft 3) report a series of observations to determine the resorption, elimination, and action of quinine on man and animals.—*Jahresb. ü. Tier Chem. Wiesb.*, 1907, v. 37, p. 783.

Schmitz, Richard, discusses the elimination of quinine in the urine of man, the form in which it is eliminated, the amount thus eliminated, and the influence of different modes of administration on the elimination of the drug.—*Arch. f. exper. Path. u. Pharmacol.*, Leipz., 1907, v. 56, pp. 301–313.

Wyman, Walter, discusses the March of Sanitation and cites the use of quinine in Italy in reducing the death rate from malaria.—*J. Am. M. Ass.*, 1907, v. 48, pp. 1830–1835.

Sandwith, F. M., mentions the use of quinine, among a large number of drugs which are used in the treatment of dysentery.—*Lancet*, Lond., 1907, v. 173, pp. 1589–1592.

A contributor to the "Medical News" column states that the Academy of Medicine of Rome has petitioned that the Government have quinine tannate lozenges distributed for children in malarial regions. The tannate is said be borne when there is considerable vomiting, and it influences diarrhea favorably.—*J. Am. M. Ass.*, 1907, v. 48, p. 1362.

An editorial discusses the hypodermic use of quinine and reviews a number of communications on the use of the several salts of quinine and their combinations.—*Therap. Gaz.*, Detroit, 1907, v. 31, pp. 387–388.

Maurel and d'Orel discuss the influence of the paths of administration (gastric, hypodermic, intravenous, etc.) on the minimal lethal dose of neutral quinine hydrobromate.—*Compt. rend. Soc. de biol. Par.*, 1907, v. 62, pp. 1179–1180. (See also under Sparteine sulphate and "Methods of Administration.")

Solis-Cohen, S., states that he has demonstrated a hundred times that a single injection of quinine with urea will suffice to secure a period of thirteen or fourteen days in single tertian, or one of six or seven days in double tertian, infection in which no paroxysms occur. The coincidence of these periods is suggestive of some fundamental relation between the various phenomena, but just what it is Solis-Cohen does not attempt to say.—*J. Am. Med. Ass.*, 1907, v. 49, p. 158.

Ziemann, Hans, recommends the so-called four-day universal prophylaxis against malarial fever. He orders 1 gm. of quinine every four days.—*Brit. M. J.*, 1907, v. 2, p. 1047.

Prout, W. T., discusses the use of quinine in the treatment of black water fever, the mode of administration, and its use as a prophylactic.—*Ibid.*, v. 2, pp. 1326–1327.

Braddock, Charles S., states that he found quinine an infallible diagnostic test for bubonic plague. If it caused the reduction of fever in suspected cases it was not plague.—*N. York M. J.*, 1907, v. 85, pp. 1119–1120.

Robinson, William J., discusses the use of the several salts of quinine as an injection and for irrigating the bladder in bacteriuria and in subacute cystitis.—*Critic and Guide*, New York, 1907, v. 10, September, pp. 83–84.

For additional references on the use of quinine, see the Index Medicus and the *J. Am. M. Ass.*

QUININÆ BISULPHAS.

Stansfield, J. M., wonders why quinine bisulphate is directed to be preserved in dark amber-colored, the sulphate in well-stoppered bottles preferably of an amber color, and in a dark place and other quinine salts in well stoppered, amber-colored vials without further directions as to location.—*Proc. Florida Pharm. Ass.*, 1907, p. 10.

Thurston, Azor, asserts that quinine bisulphate is lævorotatory in aqueous or alcoholic solutions.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 37) reports that of 2 samples of quinine bisulphate examined, one contained foreign bases.

QUININÆ HYDROCHLORIDUM.

Stansfield, J. M., questions the advisability of retaining quinine sulphate and quinine bisulphate in the U. S. P.; they are relics of the ancients. He believes that quinine hydrochloride is by far the most desirable of the several quinine salts either for internal or external use.—*Proc. Florida Pharm. Ass.*, 1907, p. 10.

Thurston, Azor, asserts that quinine hydrochloride is lævogyrate in aqueous or alcoholic solutions.—*Merck's Report*, N. Y., 1907, v. 16, p. 124.

Howards & Sons point out that the Ph. Japon III has adopted the Ph. Germ. IV test, which is absolutely unattainable for an ordinary commercial article, and it is doubtful whether any commercial quinine has ever been prepared to pass this test.—*Chem. & Drug. Lond.*, 1907, v. 71, p. 693.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 38) reports that one of four samples of quinine hydrochloride examined contained sulphuric acid and foreign cinchona bases.

Manwaring and Ruh discuss the effect of quinine hydrochloride and other agents on phagocytosis, and conclude that quinine hydrochloride, added in increasing amounts, causes a stimulation in phagocytosis, phagocytosis reaching a maximum as soon as the concentration reaches 1/200 per cent. A further increase in quinine hydrochloride causes a decrease in this stimulation, phagocytosis being reduced to normal as soon as the concentration reaches 1/120 per cent. In larger amounts, quinine hydrochloride causes a depression in phagocytosis, phagocytosis apparently ceasing soon after the concentration reaches 1/40 per cent. Whether the observed stimulation is a permanent stimulation or a transient stimulation, to be succeeded by a depression has not been determined.—*J. Exper. M.*, N. Y., 1907, v. 9, pp. 473-486.

Sylvestrini, E., (*Gaz. deg. Osped. e delle Cliniche*, Milan, v. 28) employed quinine hydrochloride in the treatment of phagedenic ulcer-

ation, neglected wounds, whitlow, etc., with excessive granulation with excellent results. He finds it an excellent substitute for silver nitrate, being a painless caustic.—J. Am. M. Ass., 1907, v. 49, p. 888.

QUININÆ SULPHAS.

Blome, Walter H., (com. on adulterations) reports on samples of quinine sulphate; 3 contained excess of other alkaloids of cinchona.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Caspari, Chas. E., (com. on adulterations) examined 19 samples, 17 satisfactory; 2 contained excess of other cinchona alkaloids.—Proc. Missouri Pharm. Ass., 1907, p. 145.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 38) state that no sample required more than 6 mils. of ammonia solution when tested by Kerner's test as given in the B. P. Codex and U. S. P.

The inspectors of pharmacies assert that quinine sulphate is generally poorly preserved, and is frequently impure, being contaminated with other cinchona alkaloids.—Ann. de pharm. Louvain, 1907, v. 13, p. 330.

Philipp Röder (Jahresbericht, Wien, 1907, p. 38) reports that of 7 samples of quinine sulphate examined 3 contained foreign cinchona bases. The water of crystallization varied from 7.8 to 13.6 per cent, being in each case well below 15 per cent.

Wilson, Thomas M., reports a number of observations on the action of quinine sulphate on human blood, studied both in vivo and in vitro.—Am. J. Physiol., Bost., 1907, v. 19, pp. 445-460.

Askenstedt, Fritz C., reports a proving of quinine sulphate and sounds a word of warning with regard to the abuse of large doses of quinine. "Their disorganizing action upon the blood and the embarrassment they incur upon certain metabolic processes must greatly hamper nature's efforts at repair, which in inflammatory conditions are further embarrassed by a negative chemotaxis induced by quinine, as Metchnikoff and others have pointed out.—Hahnemann. Month., Phila., 1907, v. 42, pp. 241-249.

RENNIN.

Laqueur, Ernst, (Biochem. Centralbl. v. LV, pp. 333-347) discusses the action of rennin on milk and casein, the theories that have been advanced and the behavior of the ferment at varying temperatures.—Bot. Centralbl., 1907, v. 104, p. 7.

Grognot L., (Rev. gén. chim., 10, 177) reviews the literature relating to rennet and discusses its occurrence, preparation, mode of action, preservation, and other phases of the subject.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2009.

An unsigned article discusses the occurrence of rennet, its use in the manufacture of cheese, the preparation of essence of rennet, and also calls attention to the fact that the powder does not lose its strength by keeping, as the essence is liable to do.—*Sc. Am. Suppl.*, N. Y., 1907, v. 63, pp. 26311–26312.

An answer to a correspondent points out that the value of rennin depends upon its power to curdle milk, and that the only test for rennin now available is the determination of this milk-curdling property by a series of comparative tests, noting the amount of milk each sample will curdle in the same unit of time.—*Pharm. Era*, N. Y., 1907, v. 37, p. 277.

Siegfeld, M., (*Milkwirtschaft. Zentr.*, 3, 426–430) discusses the influence of moderate degree of heat on rennet ferment.—*Chem. Abstr. Am. Chem. Soc.*, 1908, v. 2, p. 433.

Madsen & Walblum (Danish Inst. for Serum Therapy) give a formula by means of which the spontaneous decrease in the activity of rennet during heating can be expressed.—*Ibid.*, v. 1, p. 199.

RESINA.

Levy, Paul, discusses the constitution of American rosin.—*Ber. d. deutsch. chem. Gesellsch.*, 1907, v. 40, III, pp. 3658–3660.

Vesterberg, Albert, makes a contribution to our knowledge of coniferous resin acids, discusses the empiric formula for abietinic acid and the behavior of dextro pimaric acid on distillation in vacuo.—*Ibid.*, v. 40, pp. 120–123.

Koritschoner, F., presents a communication to the knowledge of abietinic acid, reviews some of the literature relating to the substances, and discusses its composition.—*Ztschr. f. ang. Chem.*, Berl., 1907, v. 20, pp. 641–645.

Tschirch and Wolff discuss the occurrence of abietinic acid in rosin oil and demonstrate that it is present in appreciable quantities.—*Arch. d. Pharm.*, 1907, v. 245, pp. 1–4.

Dietrich, Karl, (*Pharm. Zentrh.*, v. 47, p. 852) asserts that Claretta resin is obtained from *Azorella compacta*, a plant growing in Chile. It is dark in color and has an acid aromatic odor. It contains considerable amounts of impurities from the plant; 16 to 19 per cent of its weight is lost upon drying at 100° and the ash amounts to 2 to 3 per cent.—*Chem. Abstr. Am. Chem. Soc.*, v. 1, p. 221.

Fahrion, W., discusses the autoxidation of rosin and the various uses to which rosin is being put at the present time.—*Ztschr. f. ang. Chem.*, Berl., 1907, v. 20, pp. 256–261.

Kline and Graham point out that powdered rosin will not keep unless some commercial substance is added to prevent the powder from running together. Incomplete solubility in alcohol detects this contamination.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 86.

Graham, Willard, examined three samples of rosin having a specific gravity of 1.08, an ash content ranging from 0.03 per cent to 0.6 per cent, and acid number from 162.5 to 165.5.—*Ibid.*, p. 238.

RESINA PODOPHYLLI.

Smith, Kline & French Co. report examinations of Podophyllin made by alcohol and acetone processes. By alcohol, physical appearance light greenish yellow. Solubility in alcohol 98.8 per cent, in ether 90.85, in chloroform 74.95, ash 0.75. Acetone process, physical appearance brownish yellow. Solubility in alcohol 98.9, in ether 93.15, in chloroform 75.2, ash 0.70. One hundred pounds of drug by the alcohol method gave 4.25 per cent, by the acetone method 4.75 per cent. Previous lots had yielded 5.5 per cent. It is yet to be proven if the acetone product is the same chemically and therapeutically as the U. S. P. alcohol product.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 330.

Southall's Report (1907, 32) notes 5 specimens of podophyllin from *P. peltatum* which gave 7.04, 7.40, 11.80, 11.20, and 7.88 per cent, respectively, of matter insoluble in ammonia. One specimen from *P. emodi* gave 58 per cent of insoluble matter with ammonia.—Year Book Pharm., Lond., 1907, p. 130.

The inspectors of pharmacies assert that it is rare to find a sample of podophyllin that is entirely soluble in alcohol or solutions of caustic alkalies.—Ann. de Pharm., Louvain, 1907, v. 13, p. 329.

Sayre, L. E., found a sample of resin of podophyllum to contain 1.5 per cent of ash. He thinks that the pharmacopœial requirement not more than 0.7 per cent is too low, though he has seen samples in stock yielding as low as 0.4 per cent. He finds that there are two distinct grades of podophyllin upon the market, one of which is strictly U. S. P. VIII, this being practically free from ash, while the other contains an appreciable quantity of ash and is possibly 10 per cent weaker than the U. S. P. variety; but the difference in cost is much greater than this. He is inclined to favor permitting the weaker product being sold.—Bull. Kansas Bd. Health, 1907, pp. 12, 45.

RESINA SCAMMONII.

Guigues, M. P., (J. pharm. chim., 6, 24, 498-501) gives a method for the determination of the optical rotation of scammony resin. He shows that it is possible to adulterate resin of scammony with its own weight of colophony without detection, if the solubility assay alone be employed. Sophistication to but a small extent can be possible, however, if the polariscope be used in conjunction with the solubility test.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 624.

RESORCINOL.

Walton, L. L., reports some observations on the incompatibility of resorcin with liquid petrolatum.—Proc. Pennsylvania Pharm. Ass., 1907, pp. 111-112.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, pp. 47-50) have found that resorcinol is a suitable substance for the quantitative separation of cineol from the oils, in oil of eucalyptus. The method of separation is outlined and comparative results are recorded.

Jamieson, W. Allan, states that resorcin favors desquamation in ichthyosis, tending to leave the skin polished and pliant, hence its use is especially indicated. Sulphur and salicylic acid are not satisfactory in the treatment of this disease.—Brit. M. J., Lond., 1907, v. 1, p. 364.

Seibert, A., discusses Prophylaxis in Epidemic Cerebrospinal Meningitis, and states that a solution of equal parts of alcohol and resorcin is useful to disinfect the naso-pharynx. It should be used to prevent further absorption and expectoration of meningococci by the patient and in all persons who have been exposed to the infection.—J. Am. M. Ass., 1907, v. 49, pp. 1657-1658.

This paper was discussed by F. S. Churchill, Alfred Hand, A. W. Fairbanks, and Myer Solis-Cohen.

RHAMNUS PURSHIANA.

A review of the London drug market asserts that contrary to all expectations the crop of cascara sagrada is unprecedentedly short, and that the total of the available drug on the market is between 650 and 700 tons.—Chem. & Drug., Lond., 1907, v. 71, p. 486.

A news note points out that the season's harvest of cascara bark is ended. Washington furnishes about 20 carloads. Oregon shipped 7 carloads. This is a very small harvest as compared with that of previous years. In 1904 Oregon shipped 200 carloads. The market is now very strong. English cable advices state that 10 tons were sold at auction in London at 12½ cents per pound.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 429.

Knopf (Jour. de Pharm., 1907, 31) points out that the principal purgative constituent of cascara sagrada is a salt of potassium, which has no bitter taste. He has separated this organic salt by making an aqueous extract of the powdered bark and evaporating the liquid *in vacuo*. The dry extract is taken up by alcohol, which dissolves a large portion of it. The part insoluble in alcohol is redissolved in water, and a little alcoholic solution of caustic potash is added. This is collected, washed with alcohol, and dried *in vacuo*. This is the impure salt of potash, which is without taste or odour, and has a strong purgative action.—Chem. & Drug., Lond., 1907, v. 70, p. 190.

Philipp Röder (Jahresbericht, Wien, 1907, p. 45) reports that 7 samples of bark varied in ash content from 3.46 to 6.32 per cent.

Gilmour, J. P., found a number of samples of fluid extract of cascara sagrada which contained glycerin. He points out that the objection is not to the glycerin, but to the attempt to pass off a glycerin-ated liquid extract of cascara as a Ph. Brit. preparation. The samples examined varied extraordinarily as to the percentage of extractive. One sample yielded as much as 30 per cent, but there were some as low as 18 per cent.—Pharm. J. Lond., 1907, v. 25, p. 110.

Franklin, J. H., presents a formula for an improved form of liquid extract of cascara sagrada, using glycerin as a preservative.—Year Book Pharm., Lond., 1907, p. 433. (See also Pharm. J. Lond., 1907, v. 25, pp. 113–114.

Panchaud expresses the belief that removing the bitter taste of cascara with magnesium oxide tends to make an appreciable quantity of the oxymethylantraquinone insoluble and thus impair the activity of the resulting preparation.—Schweiz. Wchnschr. f. Chem. ü. Pharm. Zürich, 1907, v. 45, p. 519.

Caesar and Loretz (Geschäfts Ber., 1907, p. 14) discuss the conclusions arrived at by Panchaud, and point out that experience would indicate that fluid extracts of cascara prepared with magnesium oxide are still prompt and reliable in their action.

Gilmour, J. P., doubts the practicability of removing the bitter taste of cascara by heating with alkali. He suggests the setting of the mixture of extract and alkali aside for three months or longer as being the more desirable method.—Pharm. J. Lond., 1907, v. 25, p. 860.

Lyon, W., discusses the production of tasteless extract of cascara and asserts that he has never been successful in obtaining a bitterless, much less a tasteless, extract as a result of boiling with a solution of potash or solution of ammonia. He believes that a palatable and yet active liquid extract of cascara is still a desideratum.—*Ibid.*, v. 25, p. 695.

Dawson, Edward S., records his experience in making a lot of 5,000 cc. of fluid extract of cascara sagrada, aromatic, and points out some of the difficulties that were encountered.—Proc. New York Pharm. Ass., 1907, p. 225.

Gane, E. H., points out that cascara sagrada yields an average extract of 28.5 per cent to the official menstruum and that the resulting fluid extract contains approximately 29.1 per cent by weight or 23.9 per cent by volume of absolute alcohol. Distilled, 29.1 per cent by volume.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 319.

Kroeber, Ludwig, reports a comparative examination of the fluid extract of frangula and of cascara sagrada to determine the practicability of readily differentiating them by chemical means.—Pharm. Prax., 1907, v. 6, pp. 417–418.

RHEUM.

Goris and Crété report a study of Chinese rhubarb and show that the tannoides and anthraquinone compounds are contained in the same cells, and that these cells are distributed in the medullary rays and more or less isolated in the inner bark, woody and cortical.—Bot. Centralbl., 1907, v. 105, p. 415.

Goris and Crété review the latest acquisitions of science with reference to Chinese rhubarb, from the standpoint of its chemistry, anatomy, and commerce. Two plates, 6 figures.—Bull. d. sc. pharmacol., 1907, v. 14, pp. 93–104.

Gilson, E., (Rev. Pharm., 22, 289, 321, 353) discusses the purgative principles of Chinese rhubarb, which are held to be due to a combination (compound, not mixture) of four glucosides, named rheopugarin; its characters and those of the four glucosides are given with methods of separating the latter.—Year Book Pharm. Lond., 1907, pp. 136–138.

Tschirch, A., discusses the origin of Chinese rhubarb and concludes that the "southern" rhubarb, from Szetschwan, is obtained from *Rheum officinale*, while the "northern" rhubarb, from Kuku-noor, is obtained from *Rheum palmatum* β . *tanguticum*.—Arch. d. Pharm., 1907, v. 245, pp. 680–683.

Gehe & Co. (Handels-Bericht, 1907, p. 46) discuss the trade in Chinese rhubarb and present a table showing the amount of rhubarb exported from Shanghai to several ports during the years 1899–1906, inclusive. The total exports in 1906 amounted to 5,012 piculs.

Tschirch and Edner discuss the valuation of rhubarb and recommend the colorimetric method first proposed by Tschirch. They also report precipitation experiments with p-diazonitro aniline, according to the method proposed by Bader (Bull. Soc. d. Scient. din Bucaresci, 8, 51, 1899) for the precipitation of phenols and oxyazo compounds. They also present a table giving the comparative value of Chinese and European rhubarb.—Arch. d. Pharm., 1907, v. 245, pp. 150–153.

Morstatt, H., discusses the varieties of rhubarb and their valuation, reviews the history of the drug, and points out some of the characteristics of the more desirable Shensi rhubarb.—Suedd. Apoth. Ztg., 1907, v. 47, p. 480.

Tschirch and Edner report a study of the history, nature, and composition of English and of French rhubarb. The sample of English rhubarb examined they conclude was not derived from *Rheum rhaponticum*, while the sample of French rhubarb was.—Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, pp. 245–251.

Alvarez, E. Pinerua, describes a color reaction produced by chrysophanic acid and emodin with the new general reagent for polyphenols, the hydrate of sodium dioxide.—*Pharm. J. Lond.*, 1907, v. 24, p. 6.

The inspectors of pharmacies found Rhapontic and Persian rhubarb in place of Chinese. The former, while of good appearance, is inferior to the Chinese drug.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 279.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 107) reports on 6 samples of rhubarb which varied in ash from 9.43 to 14.70 per cent and yielded from 22.87 to 56.10 per cent of extract. With exception of one sample, all exceeded the 35 per cent extract required by the *Ph. Austr.* VIII.

Cæsar and Loretz (*Geschäfts Ber.*, 1907, p. 101) suggest that, in addition to the *Ph. Germ* IV tests, rhubarb should conform to a colorimetric valuation according to the method outlined by Tschirch; also present tests for the absence of rhapontic root and of curcuma.

Voss, A., (*Pharm. Post*, 1907, 22, 92) prepares roasted rhubarb by gently roasting dried rhubarb in small pieces in an iron pot over an open fire until it assumes a light-brown color; it is used in the same way as ordinary rhubarb.—*Pharm. J. Lond.*, 1907, v. 24, p. 403.

Alcock, F. H., found the compound tincture of rhubarb containing 15 per cent of total solids, including glycerin, giving an insoluble residue of 0.4 per cent, another sample giving a residue of 0.37 per cent only.—*Ibid.*, v. 25, p. 738.

RHUS GLABRA.

Nelson, Burt E., describes and figures the structural characteristics of *rhus glabra*.—*Merck's Report*, N. Y., 1907, v. 16, p. 38.

Greene, E. L., (*Proc. Washington Acad. of Sciences*) has made an exhaustive study of the plants throughout the country which have been referred to *Rhus glabra* Lin. As the result of this study he has separated 28 segregates, five of which had already been suggested.—*Bull. Pharm.*, 1907, v. 21, p. 303.

ROSA GALLICA.

Kramer, Hans, describes and illustrates the structural characteristics of rose petals, whole and powdered.—*Ber. d. pharm. Gesellsch.*, Berl., 1907, v. 17, pp. 354–357.

SABINA.

Perrot, E., Collin, and others have shown that savin is, as it were, totally replaced in commerce by the young branches of *Juniperus phænicea*, common in the Mediterranean region, the oil of which differs in all points from that of savin. It is scarcely to be wondered

at, therefore, that savin has come to be inactive and has ceased to have a part in the therapeutic and veterinary arsenal.—Bull. d. sc. pharmacol., Par., 1907, v. 14, p. 348.

Garnier, L., having reported (Ann. d'hyg. publique de méd. légale, Par., 1906, v. 5, pp. 549–557) the cause of death of a victim and her previous abortion to be due to the ingestion of a large dose of a substance very irritant to the digestive tube, which seemed to be powdered savin or its oil. Perrot calls attention to the ease with which savin may be recognized by the microscope, thus avoiding a long, difficult, and inconclusive research.—*Ibid.*, p. 371.

Kinyon points out that the great keynote of “Sabina” is the constant uneasiness and discomfort in the region of the lumbar vertebræ with a drawing pain from behind the uterus to the pubis. These pains are labor-like in character, and they often extend down the thighs.—Tr. Am. Inst. Homœop., 1907, 63rd session, p. 390.

SACCHARUM.

Löb, Walther, discusses the probable chemistry of the production and the utilization of sugar in nature.—Ber. d. pharm. Gesellsch., Berl., 1907, v. 17, pp. 117–135.

Elkin, Z. C., (Bur. of the Census, U. S. Bul. 61, pp. 59–69) reports statistical and other data regarding the present condition and distribution of the beet-sugar industry in the United States. According to the figures presented, the total value of the beet-sugar products in 1905 was \$25,393,794, an increase of 233.1 per cent over the value for 1900 to 1905.—Exp. Sta. Rec., 1907–1908, v. 19, p. 166.

Kassner, G., (Ber. Deut. Pharm. Gesell., 17, 1907, No. 6, pp. 243–250) reports experiments in which about 75 per cent of the sugar in expressed beet juice was precipitated in combination with calcium sulphate and calcium oxide. He suggests the possibility of improving the method for practical use in the sugar industry.—*Ibid.*, v. 19, p. 810.

Cohn, Alfred I., points out that the U. S. P. test for added blue does not exclude the use of aniline blues which are now being used to “face” sugars. He thinks that until aniline dyes have been shown to have practically no action on remedial agents it would be better to insure their absence by proper tests.—Proc. N. Y. Pharm. Ass., 1907, p. 234.

Gilmour, J. P., thinks the Ph. Brit. tests for sugar are not stringent enough, and should be devised to exclude all “faced” sugars, which play havoc with medicinal syrups. The U. S. P. stipulation that aqueous and alcoholic solutions should not deposit a sediment on prolonged standing meets the case.—Pharm. J. Lond., 1907, v. 25, p. 110.

Chavassieu & Morel (Nouv. Remèdes, 23, 1907, 174) recommend metadinitrobenzene as an efficient test for the detection and differentiation of sugars.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 908.

Cochran, C. B., (Jour. Amer. Chem. Soc., 29, 1907, No. 4, pp. 555-556) gives the results of numerous experiments with acid mercuric nitrate solution as an inverting agent for sucrose.—Exp. Sta. Rec., 1906-1907, v. 18, p. 1020.

Ito, S., reports his results with Allihn's modification of Fehling's method for the estimation of sugar by weighing the resulting oxide direct.—J. Pharm. Soc. Japan, 1907, p. 1379.

Wiechmann, F. G., (Internat. Sugar Jour., 9, 1907, No. 98, pp. 68-77) in view of results obtained in his investigations of the determination of sucrose and reducing sugars in fluid saccharin products recommends for this purpose the retention of the present composition of Fehling's solution, clarification with basic lead acetate before the determination of the sucrose and reducing sugars, and the exclusive use of a gravimetric method for the determination of both sucrose and reducing sugars. He gives a gravimetric method for the purpose.—Exp. Sta. Rec., 1906, 1907, v. 18, pp. 709-710.

Buchner, Meisenheimer, and Schade (Ber., 39, 4217-'31) report their experiments on the fermentation of sugar.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 1041.

Murlin, J. R., points out that a specific relationship has been shown to exist between carbohydrates ingested and the elimination of nitrogen (or protein metabolism, as measured by nitrogen output). Carbohydrate, not needed for combustion (extra metabolic), is far more efficacious in reducing the nitrogen output (therefore favoring the retention of proteid) than carbohydrate coming within the requirement for potential energy. This fact indicates the importance of abundant carbohydrates for convalescence and growth, and may explain the almost universal craving for sweets, especially in the young.—Am. J. Physiol. Bost., 1907, v. 20, p. 256.

An abstract discusses the relations of sugar and alcohol, and points out that chemically the two products are nearly identical. Physiologically, their action is somewhat similar, since alcohol in small quantities is quickly absorbed and becomes an energy producer.—Paint, Oil and Drug Rev., Chicago, 1907, v. 44, October 2, p. 21.

Meyer, G., (Deutsche med. Wchnschr., v. 33, No. 33) uses granulated sugar after heating to 140° and mixing with salicylic acid as an application to wounds before granulation begins. The absence of pain is regarded as evidence of the protection against infection owing to the drying out of the wound.—J. Am. M. Ass., 1907, v. 49, p. 1152.

SACCHARUM LACTIS.

Marshall and Kirkness report experiments to test the accuracy of Bert's hypothesis regarding the formation of lactose from glucose. Their experiments were negative.—*Biochem. J., Liverpool, 1907, v. 2, pp. 1-6.*

Porcher, C., (*Rev. Gén. Lait. 6, 1906, Nos. 3, pp. 49-56; 4, pp. 73-85*) describes various methods employed for the determination of lactose in milk and concludes that the most generally acceptable method consists in treating the milk with mercuric nitrate and titrating against Fehling's solution.—*Exp. Sta. Rec., 1907-8, v. 18, pp. 810-811.*

Hankey, W. T., asserts that the milk sugar that we get, usually yields from 0.01 to 0.02 per cent of ash; very rarely 0.025 per cent. This is just one-tenth of the amount allowed in the U. S. P. He suggests that the standard be raised to 0.025 per cent of residual ash.—*Am. Drug., N. Y., 1907, v. 50, p. 9.*

Scoville, W. L., states that all samples examined contained appreciable quantities of free lactic acid and casein, but will pass U. S. P. tests.—*Proc. Am. Pharm. Ass., 1907, v. 55, p. 327.*

Gausby, R. A., reports one lot of milk sugar containing powdered glucose.—*Proc. Pennsylvania Pharm. Ass., 1907, p. 79.*

Caspari, Chas. E., (com. on adulterations) examined 9 samples, 8 satisfactory; 1 contained metallic impurities.—*Proc. Missouri Pharm. Ass., 1907, p. 143.*

Gilmour, J. P., examined 14 samples, all Ph. Brit., though some seemed to exceed the limit for lactic acid.—*Year Book Pharm., Lond., 1907, pp. 446-455.*

Arrous, J., (*Compt. rend. soc. biol., 62, 845-47*) asserts that all the sugars are true diuretics.—*Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2141.*

SAFROLUM.

Schimmel & Co. (*Semi-Ann. Rep., October, 1907, p. 102*) note that the U. S. P. corrections up to June 1, 1907, provide that safrol should have a sp. gr. of 1.098 to 1.100 at 25° C.

SALES.

Cunan, Geo. C., discusses the making of granular effervescent preparations and presents a number of type formulas for mixtures of this kind.—*Pharm. Era, N. Y., 1907, v. 37, p. 106-107.* (See also *Merck's Rep., 1907, v. 16, pp. 99-102.*)

An editorial discusses the preparation of effervescing granules, and asserts that pharmacists need have no more difficulty in turning out medicated granules satisfactorily than they have in the making of pills.—*Pharm. J. Lond., 1907, v. 24, p. 194.*

Vanderkleed and Turner (Merck's Rep., 16, 104-106) report on the examination of a number of samples of "granular, effervescent, caffeine hydrobromide." These were prepared from tartaric acid, crystallized citric acid, sodium bicarbonate and sugar. Well-known methods for the analysis of each of the constituents were employed, care being taken to select the one most applicable to the case.

SALICINUM.

Dott, D. B., points out that the solubility of salicin as given in the Ph. Brit. (1 in 28 parts water) seems to be practically correct. The solubility at 25° C. he finds to be 1 in 24 parts of water. The U. S. P. gives the solubility as 1 in 21 parts of water at that temperature.—Pharm. J. Lond., 1907, v. 24, p. 79.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 40) have usually found salicin to melt between 197° and 204° C.

SANGUINARIA.

Henkel, Alice, describes and figures *Sanguinaria canadensis* L., commonly known as blood-root, red-root, puccoon, red Indian-plant, puccoon-root, coon-root, white puccoon, pauson, snakebite, sweet-slumber, tetterwort and tumeric.—Bul. Bur. Plant Ind., U. S. Agric. Dept., 1907, No. 107, pp. 40-41.

Vanderkleed, Charles E., reports 6 assays of sanguinaria ranging from 2.370 to 6.330 per cent. Quality generally very good.—Proc. Pennsylvania Pharm. Ass., 1907, p. 90.

Patch, E. L., examined 3 samples ranging from 5.16 per cent to 5.60 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

Kinyon, C. B., points out that "*sanguinaria canad*" is useful as a remedy when "menstruation is too early and too profuse with a discharge of black blood. When menses are regular they are too profuse. In cases of scanty menstruation or suppression look out for lung troubles. Headache is frequently relieved by the patient lying on the floor and holding her head firmly pressed against the floor with both hands pressing on the vertex and over the right eye. This position is characteristic of *sanguinaria*."—Tr. Am. Inst. Homœop., 1907, 63d session, p. 391.

Rosenberger, A. S., points out that in his experience *sanguinaria* has proven efficacious in the cough which was worse at night, awakens the patient who has to sit up and eructate gases up and down.—*Ibid.*, p. 420.

SANTONINUM.

Klein, Joseph, discusses the constitution of santonin and the production of bromine compounds.—Ber. d. deutsch. chem. Gesellsch. Berl., 1907, v. 40, pp. 937-942.

Wedekind, E. (Univ. Tübingen, Pharm. Arch., 244, 623-639), discusses thoroughly the formulas for santonin which have been submitted by other chemists.—Chem. Abstr. Am. Chem. Soc., v. 1, p. 1044.

Blome, Walter H., (com. on adulterations) reports santonin with abnormally low melting points.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Boos, J. V. D., (Pharm. Weekbl., 1907, v. 44, p. 1478) believes that the criticism by Schoorl on the reactions for santonin in the Ph. Ndl. IV are not justified.—Jarhesb. d. Pharm. Göttingen, 1907-8, v. 42, p. 241.

Reichard, C., discusses the reactions for santonin and the identifications of this lactone. He asserts that one of the best known color reactions of santonin is the violet-red solution which it yields when warmed with an alcoholic solution of potassium hydroxide. It is best obtained by heating a little santonin with alcohol and adding a few crushed fragments of caustic potash, shaking and again heating. The color is not permanent, but in the course of a few hours changes to an intense yellow.—Pharm. Ztg., Berl., 1907, v. 52, pp. 88-89.

Drake, D. J., (J. of Trop. Med. and Hygiene, Lond., Nov. 1) reports a comparison of the treatment of dysentery by means of santonin, and by other means, including the use of bismuth, ipecacuanha and other drugs, and states that the average duration of the disease was less, and the death rate much lower, in those cases in which the santonin was used.—J. Am. M. Ass., 1907, v. 49, p. 21-24.

Still, G. F., (Clin. J., Lond., Apr. 24) states that threadworms are so commonly the cause of enuresis that it is advisable to give one dose of santonin with calomel even when the presence of threadworms is denied.—J. Am. M. Ass., 1907, v. 49, p. 90.

SAPO.

Alpers, William C., presents a lengthy paper on the history and the uses of soap in pharmacy and medicine in which he reviews the history of the origin of soap and its early recognition in pharmacopœias as an article having medicinal uses.—Am. J. Pharm., Phila., 1907, v. 79, pp. 212-217. (See also J. Soc. Chem. Ind., Lond., 1907, v. 26, pp. 594-595.)

Lewkowitsch, J., reviews some of the more modern theories on the constitution of soap.—J. Soc. Chem. Ind., Lond., 1907, v. 26, pp. 590-593. (See also Ztschr. f. ang. Chem., Berl., 1907, v. 20, pp. 951-957.)

Marcusson, J., discusses the theory of saponification as proposed by Kremann, Lewkowitsch, and others. Following the experiments recorded by Lewkowitsch he has failed to find any evidence of the presence of mono or diglycerides.—Ber. d. deutsch. chem. Gesellsch., 1907, v. 40, III, pp. 2905-2915.

Rohland discusses the action of the hydroxyl ions in the production of soap.—Chem. Ind., Berl., 1907, v. 30, pp. 559-561.

Fischer, Ernest, discusses the communication by Rohland, and points out that the process of saponification introduces a large number of interesting problems and questions that are as yet unanswered.—*Ibid.*, pp. 551-563.

Stritor and Fanto present a study on the theory of the process of saponification.—Monatsh. f. Chemie, Wien, 1907, v. 28, pp. 383-396.

Jönsson, C. H. T., presents observations on the soap industry in America and discusses the nature and origin of some of the raw materials used.—Chem. Ztg., Cöthen, 1907, v. 31, pp. 242-243.

An unsigned article on the manufacture and character of soap discusses the more or less unavoidable impurities: (1) Free alkali; (2) unsaponified fats; (3) glycerin; (4) water, and makes suggestions as to limitations.—Brit. Food J., Lond., 1907, v. 9, pp. 37-39.

Hoffman, A., (Bull. soc. ind. Rouen, 2, 133-40, 1907) discusses the investigation of Mercklen upon the constitution of commercial soaps.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 2416.

Cripps, R. A., presents a note on the official soaps and gives the results of his analysis in the form of a table. He points out that it is the custom of the makers of both "hard soap" and "Castile soap" to use oils other than olive oil for their manufacture.—Pharm. J. Lond., 1907, v. 24, pp. 519-520.

Simmons, W. H., calls attention to the useful information to be derived from the determination of the refractive index of the fatty acids of soap.—Chem. and Drug., 1907, v. 60, p. 869.

Joyce, T. G., points out the desirability of providing tests for the oil from which the soaps are made. It has been rumored that large quantities of stearin are shipped annually from America to the makers of Castile soap, and it would appear worth while to insure that olive oil, and olive oil alone, shall be used where olive oil is intended.—Pharm. J. Lond., 1907, v. 24, p. 580.

Hankey, W. T., believes that sufficient tests to determine the nature of the oil used in the manufacture of official soap should be included in the pharmacopœial description.—Am. Drug., N. Y., 1907, v. 50, p. 9.

Mitchell, Edward, asserts that his firm has had much difficulty in securing a pure olive oil soap.—Proc. Arkansas Pharm. Ass., 1907, p. 91.

Scoville, W. L., points out that soft soap frequently contains an excess of caustic alkali. Always contains free carbonate alkali.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 330.

Patch, E. L., reports a sample which by the U. S. P. test required 4.5 cc. of N/10 oxalic acid equivalent to 0.5 per cent of KOH. By the neutral alcohol method the same sample gave 0.336 free KOH,

0.926 K_2CO_3 . Eight samples by the U. S. P. 1900 process tested by U. S. P. method of assay, gave from 0.25 to 0.5 per cent free KOH. Four lots of commercial by the neutral alcohol method gave 0.336 to 0.896 free KOH.—*Ibid.*, p. 330.

Vanderkleed, Charles E., (com. on adulterations) asserts that the value of powdered Castile soap depends, not only on purity, but on the amount of moisture present. Samples containing as much as 25 per cent of moisture have been noted.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 86.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, pp. 42, 43) give in a tabular form the melting point, iodine value, cotton-seed oil, sesame oil, and Reichert Meissl value of the various commercial soaps, and conclude that it is possible to obtain pure olive-oil soap on the market; that the mottled variety is often made from sesame oil and that "curd" soap of commerce usually contains 10 per cent and upward of cocoanut oil.

SAPO MOLLIS.

Caspari, Chas. E., (com. on adulterations) examined 8 samples of soft soap; 6, satisfactory, 2 contained excess of free alkali.—*Proc. Missouri Pharm. Ass.*, 1907, p. 145.

Gilmour, J. P., found 13 samples to be of Ph. Brit. standard, though the alcohol insoluble residue tends to exceed 3 per cent with most samples.—*Year Book Pharm.*, Lond., 1907, pp. 446-455.

van Itallie, E. J., outlines a method for the detection of fish oils in soft soap, based on the bromine absorption properties of the oil.—*Apoth. Ztg.*, Berl., 1907, v. 22, p. 6.

Wilbert, M. I., presents a formula for a liquid soap that is said to be efficient and economical.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 119.

Stanislaus, I. V. S., presents several formulas for the preparation of liquid soaps.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 154.

Drefuss, W., discusses the use of liquid soap from a sanitary standpoint.—*J. Soc. Chem. Ind.*, Lond., 1907, v. 26, pp. 596-597.

SARSAPARILLA.

Hartwitch, C., discusses the great uncertainty of our knowledge of sarsaparilla and points out that a number of distinctions formerly given much weight, have been altered materially in the course of time. He points out that the structural characteristics of sarsaparilla, rather than the form of packing and the supposed origin, are to be depended on to distinguish the several varieties of the drug. He also shows that the varieties of sarsaparilla are more numerous than is generally supposed.—*Ber. d. pharm. Gesellsch.*, Berl., 1907, v. 17, pp. 250-271.

Gausby, R. A., reports finding a sample of Mexican sarsaparilla root which contained over 40 per cent sand.—Proc. Pennsylvania Pharm. Ass., 1907, p. 74.

Perrot, E., calls attention to the frequent adulteration of sarsaparilla with American smilax, *Smilax medica* of the south of France and other roots belonging to different families, even the dicotyledons.—Bull. d. sc. pharmacol., Par., 1907, v. 14, p. 349.

An unsigned article quotes Stevens, Caldwell, and 3 manufacturers as giving the percentage of alcohol in the official fluid extract of sarsaparilla as 31.5, 32, 45, 25, and 20, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

SCAMMONIUM.

Nelson, Burt E., describes scammony, gives its origin and calls attention to the appearance of its constituents.—Merck's Rep., N. Y., 1907, v. 16, p. 220.

Dohme and Englehardt call attention to a resin from *Radix scammonia mexicana* or *Radix orizabensis*, which, although not as soluble in ether and chloroform as the resin made from scammony, has the same therapeutic value.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 381.

Perrot, E., says that true scammony has a residue of 60 to 70 per cent, but that which has a residue of 30 to 40 per cent has nothing in common with the juice of *Convolvulus scammonia*.—Bull. d. sc. pharmacol., Par., 1907, v. 14, p. 351.

Caspari, Chas. E., (Com. on Adulterations) examined 2 samples; 1 satisfactory, 1 yielding too much ash.—Proc. Missouri Pharm. Ass., 1907, p. 146.

Gilmour, J. P., found 9 samples to be of Ph. Brit. standard, though some were not entirely soluble in ether.—Year Book Pharm., Lond., 1907, pp. 446-455.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 41), report three parcels of "Virgin" which contained, respectively, 83 per cent, 88.5 per cent, and 82.8 per cent of resin extracted by ether.

SCILLA.

Nelson, Burt E., describes and figures the structural characteristics of scilla.—Merck's Report, N. Y., 1907, v. 16, p. 162.

An abstract calls attention to the article by Houghton on the new U. S. P. fluid extract of squill, and points out that it would seem desirable that physicians in prescribing squill should indicate that they desire the preparation of the U. S. P. 1890, when they wish to obtain the usual therapeutic action of squill.—Drug Topics, N. Y., 1907, v. 22, p. 99.

Greenish, Henry G., reviews the pharmaceutical preparations of squill included in B. P. C., and presents a formula for liquid extract of squill; also formulas for vinegar, syrup, and tincture of squill.—Pharm. J. Lond., 1907, v. 25, p. 99.

Cohn, Alfred I., points out that in the directions for making the compound syrup of squills, no account has evidently been taken of the fact that the fluid extract of squill is made with acetic acid, while the fluid extract of senega is made with a menstruum containing potassium hydroxide. To prevent precipitation of the polygalic acid he thinks it advisable to have the preparation alkaline.—Proc. New York Phar. Ass., 1907, p. 235.

Joyce, T. G., presents a note on oxymel scillæ and suggests that more definite description be included in the Ph. Brit. for the finished product.—Pharm. J. Lond., 1907, v. 24, p. 744.

SCOPARIUS.

Perrot, E., says that the flowers of *Sarothamnus scoparius* are frequently adulterated with those of *Spartium junceum*. In spite of supervening accidents and his warnings, this dangerous substitution is quite current.—Bull. d. sc. pharmacol., Par., 1907, v. 14, p. 348.

SCOPOLA.

Dohme, A. R. L., discusses the practicability and need for the use of scopola in place of belladonna and points out that the U. S. P. revision committee could sanction the use of scopola as belladonna without violation of any principles or establishing a new precedent.—Proc. Am. Pharm. Ass., 1907, v. 55, pp. 502–504.

An editorial points out that some years ago the opinion was strong that scopola was a most efficient substitute for belladonna. It appears, however, that manufacturers making preparations requiring belladonna refuse to look upon scopola as an equal, and consider it as an adulterant and not as a substitute. They declare that it does not have the properties of belladonna. Even with the scarcity of the true article, they refuse to employ the so-called bastard belladonna.—Pacific Pharm., San Francisco, 1907–8, v. 1, p. 87.

SCOPOLAMINÆ HYDROBROMIDUM.

An unsigned review of the Ph. Ndl. IV points out that scopolamine is considered to be identical with hyoscyne, despite their variation of origin and the fact that they are separately listed by some manufacturers.—Pharm. Weekbl., 1907, v. 44, p. 1385.

Reichard, C., points out that it has now been established beyond any peradventure of doubt that scopolamine is identical in all

respects with hyoscine, and outlines a number of reactions that are characteristic of this substance.—Pharm. Zentralh., 1907, v. 48, pp. 659–664.

Riedel, J. D. (Pharm. Zeit., LII, p. 292), finds that scopolamine picrate forms narrow, rather long tablets or needles melting at 190 to 191° C.—Merck's Report, N. Y., 1907, v. 16, p. 291.

Kessei, Otmar G. (Arch. intern. pharmacodyn, 16, I, Pharmacol. Inst., Jena), asserts that the physiological action of inactive and active scopolamine is alike. The inactive alkaloid can be used for therapeutic purposes as well as the active. The harmful effects observed from the use of individual samples of scopolamine are due to an admixture with apoatropine.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 60.

Chevalier, before the Société de Thérapeutique, reviewed the question of the toxicity of scopolamine and reported an observation of great interest. Dubar, suffering from asthmatic crises, administered to himself a hypodermic injection of 0.0005 gm. scopolamine hydrobromate, had vertigo, and was obliged to go to bed; slept, but was delirious and presented grave convulsive phenomena with hallucinations of sight. It was only after 12 hours that the symptoms disappeared.—J. de pharm. et de chim. Par., 1907, v. 26, p. 516.

Bardet discusses the dangers of scopolamine for general anæsthesia.—Répert. de pharm. Par., 1907, v. 19, p. 521.

Moore, A. W., reports a case of poisoning in a child of 4½ years resulting from 1 drop of a 1 per cent solution of scopolamine in the eye. The symptoms included restlessness, pleasant delirium, and finally deep sleep.—Lancet, Lond., 1907, v. 172, p. 1084.

Heizer, W. L., is reported to have said that scopolamine and hyoscine are practical identical, and that the scopolamine-morphine combination had been found to be dangerous for anesthesia.—J. Am. M. Ass., 1907, v. 49, p. 1551.

The editor details the technic of Gauss for the administration of scopolamine-morphine for anesthesia, in response to a query.—*Ibid.*, p. 1299.

Wood, H. C., jr., in answer to a query, reiterates his assertion that scopolamine-morphine anesthesia is dangerous, and that hyoscine is identical with scopolamine and has little or no analgesic action.—*Ibid.*, v. 48, p. 159.

Abbott, W. C., calls attention to Wood's condemnation of scopolamine-morphine anesthesia, and states that he has also condemned the use of scopolamine, but that hyoscine is quite different from scopolamine.—*Ibid.*, pp. 344–345.

An editorial comments on Abbott's letter, and states that the identity of scopolamine and hyoscine is no longer a question among scientific men, and further no amount of juggling can conceal the

fact that "hyoscin-morphin" anesthesia is fraught with great danger.—*Ibid.*, v. 48, pp. 344-345.

Bryant, Edgar R., presents a report of personal experience with scopolamine-morphine and spinal anesthesia and asserts that scopolamine is a harmless drug when administered in ordinary doses, and when investigating the adverse reports as to scopolamine-morphine, morphine alone, or possibly the combination of morphine and scopolamine should receive careful attention.—Tr. Am. Inst., Homœop., 1907, 63d session, pp. 662-675.

SENEGA.

Henkel, Alice, describes and figures *Polygala senega* L., commonly called Seneca snakeroot, senega, senega snakeroot, Seneca-root, rattle-snake-root and mountain-flax.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 45-47.

Holm, Theo., discusses the history of Seneca snakeroot and describes and figures the root and other portions of the plant.—Merck's Report, N. Y., 1907, v. 16, pp. 155-157.

Farwell, O. A., asserts that the hard, woody, keelless roots of *Polygala alba* Nutt, are often offered as a substitute for the official senega. He does not believe that the Manitoba senega is the product of *Polygala alba* Nutt, as this drug has the characteristic keel-like ridge of the official senega and is derived from both the official *Polygala senega* and the broad-leaved form sometimes separated as the var., *latifolia* T. & G.—*Ibid.*, v. 16, p. 221.

Currie, A., concludes that precipitation in infusion of senega is due directly or indirectly to the action of bacteria.—Pharm. J. Lond., 1907, v. 24, p. 359.

Kinyon, C. B., points out that Senecio was called by the late Doctor Streeter the great female regulator. Unlike pulsatilla, the courses may be too profuse, premature, but the great indication for this remedy is irregular menstruation or suppressed menstruation followed by vicarious menstruation.—Tr. Am. Inst. Homœop., 1907, 63d session, p. 391.

SENNA.

Hankey, W. T., found good senna leaves to yield, on ignition, 8.5 to 9 per cent ash; 12 samples of powdered senna yielded from 10.50 to 24.60 per cent of ash. He believes that the addition of a limit for ash might be advisable.—Am. Drug., N. Y., 1907, v. 50, p. 9.

Dawson, Edward S., reports his experience with fluid extract of senna. He comments on the quantity of alcohol required to make this preparation, and expresses the opinion that it will not become popular for economic reasons.—Proc. N. Y. Pharm. Ass., 1907, p. 225.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of senna as 48.9, 43, 50, 40, and 30 per cent, respectively.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 319.

SERPENTARIA.

Henkel, Alice, describes and figures *Aristolochia serpentaria* L., commonly known as Virginia serpentaria, Virginia snakeroot, serpentary, snakeweed, pelican-flower, snagrel, sangrel, sangree-root, Virginia serpentaria, also *Aristolochia reticulata* Nutt., the Texas serpentaria.—*Bull. Bur. Plant Ind.*, U. S. Dept. Agric., 1907, No. 107, pp. 26–27.

Holm, Theo., describes and figures *Aristolochia serpentaria* L., including the histological structure of the several portions of the plant.—*Merck's Report*, N. Y., 1907, v. 16, pp. 276–279.

SERA.

Otto, R., (*Arb. K. Inst. Expt. Ther.* Frankfurt, 1906, No. 2, pp. 86, figs. 8) gives an account of the commercial manufacture of antitoxic and antibacterial sera, together with historical notes on the development of a method for the government control of these products. The present report contains a detailed discussion of the routine method by which commercial concerns obtain permission to sell their sera under government inspection, and also of the methods adopted for this examination. In order to be considered harmless, sera must be shown to be clear, free from gross precipitates, bacterial contamination, and toxins.—*Exp. Sta. Rec.*, 1907, 1908, v. 19, p. 78.

Brunner and Pinkus describe a new process for the purification of therapeutic sera, especially diphtheria serum.—*Biochem. Ztschr.* 1907, v. 5, pp. 381–393.

Banzhaf and Gibson (*Research Lab. Dept. Health of the City of New York J. Biol. Chem.*, 3, 253–263) present some data on the fractional precipitation of antitoxin serum.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 2717.

Besredka, A., discusses the toxicity of therapeutic serum and the means of estimating it.—*Compt. rend. Soc. de Biol., Par.*, 1907, v. 62, p. 477.

Manwaring, W. H., (*J. Biol., Chem.*, 3, 387–389) asserts that quantitative methods for determining amboceptors are impossible.—*Ibid.*, v. 2, p. 282.

An editorial calls attention to the work of Rosenau and Anderson (*Public Health and Marine-Hospital Service, Hygienic Laboratory Bulletins No. 29 and No. 36*), in which they showed that injections of proteids from different sources caused hypersensitiveness, but leucin and tyrosin have no such sensitizing influence. The sensitizing agent

and its mode of action are as yet unknown, but it is not influenced by the various ferments and alkaloids which were tried.—*J. Am. M. Ass.*, 1907, v. 49, p. 602.

Gay and Southard (*J. Med. Research*, Bost., May) advance a theory in regard to the remarkable susceptibility to horse serum of guinea-pigs which have been previously injected with small quantities of horse serum. They describe a number of lesions associated with the intoxication produced.—*Ibid.*, v. 49, p. 281.

An editorial calls attention to the recent work of Richardson who studied the treatment of typhoid fever by means of specific serum and with material from cultures of typhoid bacilli.—*Ibid.*, v. 49, p. 1922.

An editorial calls attention to the work of the commission of the New York Department of Health with the use of a serum in the treatment of monkeys experimentally infected with *Diplococcus intracellularis*.—*N. York M. J.*, 1907, v. 85, p. 893.

Pollitzer, S., discusses Serum Therapy and the Serum Diagnosis of Syphilis.—*Ibid.*, v. 85, p. 976.

For additional references on sera and their uses see *Index Medicus* and the *J. Am. M. Ass.*

SERUM ANTIDIPHThERICUM.

Pearson, W. A., outlines the standardization of diphtheria antitoxin and calls attention to the need for care in storing this preparation.—*Proc. Pennsylvania Pharm. Ass.*, 1907, pp. 233–236.

An unsigned article presents some additional proofs of the stability of diphtheric antitoxin. A total of 23 samples of serum varying in strength from 500 to 4,000 units and in age from 23 to 46 months were found to be practically of the same test as when originally examined.—*New Idea*, Detroit, 1907, v. 29, pp. 372, 376.

Maggiara, R., contributes a study on the control of antidiphtheric serum.—*Arch. farmacol. sper. Roma*, 1907, v. 6, pp. 344–356.

An editorial discusses the oral administration of antitoxin and points out that if any method can be devised by which fairly accurate and reliable results can be obtained from the oral use of these substances a distinct therapeutic advance will be made.—*Therap. Gaz.*, Detroit, 1907, v. 31, p. 29.

Rosenau and Anderson report observations on the influence of antitoxin upon postdiphtheric paralysis. They find that a very small quantity of antitoxin (1 unit) given twenty-four hours before or at the time of infection prevents the development of paralysis, whereas 4,000 units fails when delayed forty-eight hours.—*Bull. Hyg. Lab. U. S. P.-H. & M.-H. S.*, No. 38, pp. 34, June, 1907.

Harris, Alfred, describes certain forms of pharyngeal diphtheria which are invariably fatal, and upon which antitoxin has no effect.—*Lancet*, Lond., 1907, v. 173, p. 896.

Bolton, Charles, states that when antitoxin is administered on the first day of an attack of diphtheria the mortality is only one-half of 1 per cent, but that it is useless when given after the fifth day of the disease. In severe cases as much as 24,000 units must be given and this may have to be repeated.—*Ibid.*, v. 172, p. 871.

An editorial calls attention to the occurrence of post-diphtheritic paralysis and the possibility of antitoxin being concerned and states that the recent work of Rosenau and Anderson is very suggestive at least.—*J. Am. M. Ass.*, 1907, v. 49, p. 855.

Fonde, G. H., states that in severe cases of diphtheria he has found it necessary to give as high as 50,000 units of antitoxin. He states that it seldom fails if enough is given.—*Ibid.*, v. 49, p. 1697.

Norton, Everitt E., reports the occurrence of an epidemic of diphtheria among the children of a school which persisted until the prophylactic use of antitoxin stopped it.—*Lancet*, Lond., 1907, v. 173, p. 85.

Brown, Allen, and Lupton state that immunizing doses of antitoxin should be given at intervals of two weeks for four or six weeks in case of epidemics of diphtheria in institutions.—*Am. J. M. Sc.*, Phila., 1907, v. 133, pp. 297-302.

Additional references on the use of diphtheria antitoxin will be found in the *Index Medicus* and the *J. Am. M. Ass.*

SERUM ANTITETANICUM.

An editorial calls attention to the work of the Hygienic Laboratory looking to the standardization of tetanus antitoxin and states that with the adoption of the new standard and accurate dosage this serum will be made available for therapeutic and prophylactic uses.—*J. Am. M. Ass.*, 1907, v. 48, p. 1680.

Hall, Carter, and Howard each cite an instance of the successful treatment of tetanus with antitetanic serum.—*Brit. M. J.*, 1907, v. 1, pp. 555-556.

An editorial calls attention to the value of tetanus antitoxin as a prophylactic against tetanus and states that a scrutiny of the American literature does not show a single case in the past five years in which the early prophylactic use of antitoxin was followed by tetanus. Even when tetanus develops after a prophylactic dose of antitoxin the chances of recovery are improved.—*J. Am. M. Ass.*, 1907, v. 49, p. 602.

Vincent, H., makes a contribution on the properties of mixtures of tetanic toxin and antitoxin. He found in experiments with small laboratory animals that tetanus antitoxin does not protect the animal against the development of an artificial infection even if administered within 1 hour after the animal has been removed from an

autoclave maintained at a temperature sufficiently high to elevate the body temperature of the experimental animal.—*Compt. rend. Soc. de Biol. Par.*, 1907, v. 62, pp. 158–160; 1193–1195. (See also a further note by Louis Martin, *Ibid.*, v. 62, p. 178. See also a further note by Cernovodeanu & Henri, *Ibid.*, v. 62, p. 392; 669–671; 812–815.)

Küster, E., discusses the antitoxin treatment of tetanus, reports one case treated with intraneural injections and presents some general observations.—*Therap. d. Gegenw.*, Berl., 1907, v. 48, pp. 49–52.

Senn, Nicholas, discusses the Final Triumph of Scientific Medicine, and cites the use of tetanus antitoxin and other measures by which man triumphs over disease.—*J. Am. M. Ass.*, 1907, v. 48, pp. 1825–1830.

For additional references see *Index Medicus* and the *J. Am. M. Ass.*

SINAPIS ALBA.

Mühlenfeld, Wilh., outlines a method for the valuation of *Sinapis alba*. He treats the fixed oil free and powdered seed with water for several hours, extracts the mixture with ether; after allowing the latter to evaporate at ordinary temperature, he exhausts the residue with alcohol and titrates as directed by the Ph. Germ. IV for *sinapis nigra*.—*Apoth. Ztg. Berl.*, 1907, v. 22, p. 943.

SODII ARSENAS.

Fernau, Albert, discusses the chemistry and the methods that have been suggested for analyzing sodium arsenate and sodium arsenite and reports two samples of the latter substance that proved, on examination, to be sodium arsenate.—*Pharm. Post*, Wien, 1907, v. 40, p. 133.

Alfred, Wilfrid A., relates the circumstances of poisoning with a mixture of arsenic and caustic soda, sold as weed killer, presenting some unusual symptoms.—*Brit. M. J.*, 1907, v. 2, p. 626.

SODII BICARBONAS.

Bachman, Gustav, (com. on adulterations) reports sodium bicarbonate ranging from 99 per cent to 91.3 per cent instead of 99 per cent as required by the U. S. P.—*Proc. Minnesota Pharm. Ass.*, 1907, p. 40.

Caspari, Chas. E., (com. on adulterations) examined 17 samples, 15 satisfactory, 2 contained excess of carbonate.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

Blome, Walter H., (com. on adulterations) reports 2 samples having trace of iron and a slight excess of carbonate.—*Proc. Michigan Pharm. Ass.*, 1907, p. 70.

Patch, E. L., examined 5 samples varying from 94.36 per cent to 96.31 per cent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 330.

Gilmour, J. P., found 87 samples to be of Ph. Brit. standard; none, however, withstood the HgCl_2 test.—Year Book Pharm., Lond., 1907, pp. 446-455.

The inspectors of pharmacies found sodium bicarbonate containing traces of ammonium salts and of neutral carbonate.—Ann. de pharm. Louvain, 1907, v. 13, p. 325.

Philipp Röder (Jahresbericht, Wien, 1907, p. 92) reports that of 10 samples of sodium bicarbonate examined, 2 were rejected because of an excess of monocarbonate.

An editorial calls attention to the want of proper consideration of the pharmacology of bicarbonate of soda, which has been long used for gastric pain and hyperacidity, and to a paper by Léon Meunier in the *Bulletin des Sciences Pharmacologiques*, 1906, No. 10, in which the value of the remedy in allaying gastric pain is discredited. The allaying of gastric pain, it is asserted, is due not so much to the neutralizing action of the alkali as it is to the generated carbon dioxide.—Lancet, Lond., 1907, v. 172, p. 179.

Rozenblat, Henryka, reports experimental researches on the action of sodium chloride and sodium bicarbonate on the gastric secretion.—Biochem. Ztschr., 1907, v. 4, pp. 500-541.

Lambert & Foster state that bicarbonate of soda should be discarded for some of the alkaline salts, particularly magnesium oxide, to neutralize the gastric juice in case of benign stenosis of the pylorus.—Am. J. M. Sc., Phila., 1907, v. 134, p. 347.

SODII BORAS.

Yale, Charles G., asserts that the production of borax is almost entirely confined to the State of California, and to the counties of San Bernardino, Inyo, and Ventura in that State.—J. Frnkl. Inst., Phila., 1907, v. 163, pp. 107-108.

Kline and Graham point out that commercial varieties of borax are of U. S. P. strength and purity for all practical purposes, but that they are liable to contain a very diminutive amount of such impurities as iron and aluminum, chlorides, and sulphates.—Proc. Pennsylvania Pharm. Ass., 1907, p. 83.

Rupp, E., discusses the use of sodium biborate as a standard for titrimetric solutions, points out some of its defects and outlines methods for its successful application.—Chem. Ztg., Cöthen, 1907, v. 31, p. 97.

Caspari, Chas. E., (com. on adulterations) examined 13 samples, 12 satisfactory, 1 contained phosphate.—Proc. Missouri Pharm. Ass., 1907, p. 144.

The New York State Board of Health, Eastern Branch, examined 93 samples, 74 deficient.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 324.

Baird, J. W., (com. on adulterations) reports on 7 samples, 4 genuine, 3 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 40.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 12) have also occasionally found six parts of arsenium per million in this article.

An editorial comments on the many and varied properties and uses of borax.—Paint, Oil and Drug Rev., Chicago, 1907, v. 43, Jan. 9, p. 15.

An editorial calls attention to the efforts being made to popularize the use of borax as a food preservative. Attention is called to the use of borax to give a fresh appearance to decayed and wholly inedible meat.—J. Am. M. Ass., v. 49, p. 1191.

McWalter, J. C., (Lancet, Lond., Aug. 10) reports a case of progressive wasting and erythematous eruption occurring in an infant which had developed a taste for borax and honey. When the use of the borax mixture was discontinued rapid improvement began.—J. Am. M. Ass., 1907, v. 49, p. 881.

SODII BROMIDUM.

Hankey, W. T., reports on sodium bromide which tested 89.65 per cent sodium bromide and 10.35 per cent of sodium chloride and carbonate. The alkalinity was 7 times that allowed by the U. S. P.—Proc. Pennsylvania Pharm. Ass., 1907, p. 86.

Weinstein, Joseph, reports finding deviations of from 8 to 10 per cent from the U. S. P. requirements for sodium bromide.—Proc. New York Pharm. Ass., 1907, p. 102.

The New York State Board of Health reports 13 samples examined; 2 deficient.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 331.

Caspari, Chas. E., (Com. on Adulterations) examined 11 samples; 7 satisfactory, 4 contained excess of chloride.—Proc. Missouri Pharm. Ass., 1907, p. 143.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 43) found one sample to be particularly impure, only testing 85.6 per cent of NaBr. Two further lots contained 96 per cent and 96.2 per cent, whilst a fourth was pure.

SODII CARBONAS MONOHYDRATUS.

Jurisch, Conrad W., presents a history of the evolution of the ammonia-soda industry, in the course of which he describes and figures the methods of procedure and some of the apparatus used.—Chem. Ind., Ber., 1907, v. 30, pp. 6-13; 36-46; 174-190.

Xrayser gives some additional data regarding LeBlanc's soda process, and discusses the claims that have been made for Diže's.—Chem. & Drug. Lond., v. 70, p. 295.

Sayre, L. E., examined two samples of sodium carbonate which contained 32.2 and 17 per cent of water, respectively.—Bull. Kansas Bd. Health, 1907, p. 12.

Mossler, Gustav, examined 6 samples of sodium carbonate, all of which contained chloride, but only 2 of them in excess.—Ztschr. d. Allg. österr. Apoth.-Ver., Wien, 1907, v. 45, p. 38.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 44) found the proportion of sodium carbonate to range from 70 to 99.4 per cent.

SODII CHLORIDUM.

Gilmour, J. P., found in 14 samples of Ph. Brit. standard traces of potassium and magnesium salts.—Year Book Pharm., 1907, pp. 446-455.

Raubenheimer, Otto, suggests the use of a decinormal volumetric solution of sodium chloride in place of physiological normal salt solution. This would avoid the need of keeping two distinct preparations on hand.—Bull. Pharm., 1907, v. 21, p. 514.

The editor notes that the authorities seem to be divided on the subject of physiological normal salt solution. Some chemists give 6 grammes to the liter as the proper strength, while others maintain that 9 grammes is more correct. Since the commercial houses are using 9 grammes of salt for every 1,000 cc. of this preparation, the Bulletin chose to accept the greater figure rather than the less.—*Ibid.*, v. 21, p. 514.

Löwenstein, C., discusses the relations of table salt ingestion and blood pressure in cases of nephritis.—Arch. f. exper. Path. u. Pharmacol., Leipz., 1907, v. 57, pp. 137-161.

Bayer, R., discusses the influence of sodium chloride on arteriosclerotic hypertonia, and concludes that while sodium chloride causes rise of blood pressure in cases of arteriosclerosis and many forms of myocarditis, the way in which this hypertonia is effected is as yet unknown.—*Ibid.*, v. 57, pp. 162-176.

Kinyon, C. B., points out that "natrum muriaticum" is indicated where "patient is constipated, emaciated, easily fagged out. Before menstruation is gloomy and anxious. Violent headache on waking up in the morning. After menstruation patient is hasty and irascible."—Tr. Am. Inst. Homœop., 1907, 63d session, p. 389.

Fornias, Eduardo, points out that "natrum muriaticum" is a remedy which has an extensive application in the homœopathic school, and that it is one of the drugs reproved successfully at

Vienna. He reviews some of the more recent publications on sodium chloride, and concludes that the recorded observations allow us to infer that *chloride of sodium*, when absorbed in excess of the normal requirements of the body, causes many digestive, cardio vascular, and respiratory phenomena indicative of "destructive metabolism, with great impairment of the blood life."—Hahnemann. *Month.*, Phila., 1907, v. 42, p. 121. (See also abstract (from N. A. Journal of Hom.) *Ibid.*, v. 42, p. 160.)

Fornias presents some additional observations on an analytic study of natrum muriaticum and on the therapeutics of natrum muriaticum.—*Ibid.*, v. 42, pp. 193–202; 250–266.

Additional references on the use of sodium chloride will be found in the Index Medicus and the J. Am. M. Ass.

• SODII CITRAS.

Patch, E. L., examined 10 lots, 4 contained heavy metals, 1 an excess of alkali.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 331.

Prentiss (American Journal of Obstetrics, June, 1907) discusses the use of sodium citrate in infant feeding, and points out that it has been abundantly proved that not only can richer proteid milk be digested with its aid, but a larger quantity can be taken and assimilated.—Therap. Gaz., Detroit, 1907, v. 31, pp. 874–876.

Steele, H. Merriman, is reported to have reviewed the literature of sodium citrate in infant feeding, and given his experience in 14 cases. He agrees with Chapin that it is best to interfere as little as possible chemically with the infants' milk.—J. Am. M. Ass., 1907, v. 48, p. 2203.

Additional references on the use of sodium citrate will be found in the Index Medicus and the J. Am. M. Ass.

SODII HYDROXIDUM.

Murray, Benjamin L., asserts that in testing sodium hydroxide for limit of silicate it is probable that 90 per cent alcohol will detect the silicate sufficiently well. The use of 95 per cent alcohol, as at present, conflicts with the test for limit of carbonate, since an article meeting the requirement for limit of carbonate will yield a precipitate of carbonate, not silicate, with 95 per cent alcohol. This is overcome by using 90 per cent alcohol.—Merck's Rep., N. Y., 1907, v. 16, p. 249.

Walter, Heinrich, reports observations on the influence of several factors entering into the production of sodium hydroxide.—Monatsh. f. Chemie, Wien, 1907, v. 28, pp. 543–553.

Wegschneider, Rud., comments on the observations made by Walter, and points out that these observations agree well with the recorded

experiences of Lunge-Schmid, and Le Blanc-Novotny, and that the production of caustic soda is most readily accomplished at or above 100° C.—*Ibid.*, v. 28, pp. 554–558.

SODII HYPOPHOSPHIS.

Blome, Walter H. (com. on adulterations), reports one lot of sodium hypophosphite of very poor quality. Another contained a trace of sodium hydroxide and a third sodium carbonate and aluminum.—Proc. Michigan Pharm. Ass., 1907, p. 70.

SODII IODIDUM.

Caspari, Chas. E. (com. on adulterations), examined 8 samples, 7 satisfactory; 1 contained iodate.—Proc. Missouri Pharm. Ass., 1907, p. 144.

The inspectors of pharmacies report finding samples of sodium iodide that were yellow or partially deliquesced.—Ann. de pharm. Louvain, 1907, v. 13, p. 328.

SODII NITRAS.

A news note asserts that nitrate of soda imports are unequal to the demand. The total imports into Atlantic ports for 1907 amounted to 221,345 tons, against 177,500 tons in 1905.—Oil, Paint, and Drug Reporter, New York, 1907, v. 72, Sept. 9, p. 38.

Van Dam, U. (Rec. Chim. Pays-Bas et Belg. 25, 1906, pp. 291–296) presents a method for the determination of nitrogen in nitrate of soda based upon the oxidation of oxalic acid by the nitrate in presence of manganese sulphate, with subsequent determination of the excess of oxalic acid by titration with potassium permanganate.—Expt. Sta. Rec., 1906–7, v. 18, p. 708.

SODII NITRIS.

Vaquez, H., discusses the pharmacodynamic action of the alkaline nitrites, particularly sodium nitrite, and the variation in activity due to methods of administration or special susceptibility of the individual.—Nouv. rémedes, Par., 1907, v. 23, pp. 349–351.

Desesquelle, Ed., reports a favorable result with Raymond's method of administering hypodermic injections of sodium nitrite for the fulgurant pains of tabes; he reached without inconvenience a dose of 10 centigrammes per cc.—Bull. d. sc. Pharmacol. Par., 1907, v. 14, p. 413.

SODII PHENOLSULPHONAS.

Blome, Walter H., (com. on adulterations) reports sodium sulphocarbolate having an acid reaction.—Proc. Michigan Pharm. Ass., 1907, p. 70.

Caspari, Chas. E., (com. on adulterations) examined 4 samples, 3 satisfactory, 1 contained metallic impurities.—*Proc. Missouri Pharm. Ass.*, 1907, p. 146.

SODII PHOSPHAS.

Mitchell, Edward, asserts that his firm has at last succeeded in obtaining a sodium phosphate that will make a satisfactory clear solution.—*Proc. Arkansas Pharm. Ass.*, 1907, p. 91.

Troxell, H. L., (com. on adulterations) found several samples of the dried salt containing too much sulphate. The crystallized salt is by far the better.—*Proc. Maryland Pharm. Ass.*, 1907, p. 87.

Baird, J. W., (com. on adulterations) reports on 20 samples, 18 genuine, 2 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

Caspari, Chas. E., (com. on adulterations) examined 23 samples, 22 satisfactory, 1 contained calcium and arsenic.—*Proc. Missouri Pharm. Ass.*, 1907, p. 145.

Gilmour, J. P., found in 5 samples of Ph. Brit. standard traces of sulphates and chlorides.—*Year Book Pharm., Lond.*, 1907, pp. 446-455.

SODII SULPHAS.

van't Hoff and Barschall discuss the relation of potassium and sodium sulphate to each other.—*Ztschr. d. physik. Chem.*, 1907, v. 56, pp. 212-214.

Gilmour, J. P., found in 34 samples of Ph. Brit. standard occasional traces of chloride.—*Year Book Pharm., Lond.*, 1907, pp. 446-455.

Dauwe, O., records observations on the disintoxicating action of sodium sulphate in cases of acute lead poisoning.—*Arch. internat. de Pharmacod. et de Therap.*, 1907, v. 17, pp. 418, 434.

Frankl, Theodor, discusses the several theories that have been advanced regarding the activity of saline laxatives, reports a number of observations, and concludes that solution of sodium sulphate injected into the circulation is not laxative and that the theories of Buchheim and Hays regarding the method in which saline laxatives act are probably correct.—*Arch. f. exper. Path. u. Pharmacol., Leipz.*, 1907, v. 57, pp. 386-398.

Bancroft, Frank W., reports some experiments on the relative efficiency of various methods for determining sodium sulphate, and presents a summary of his results in the form of a table. These results show clearly that the subcutaneous and intravenous administration of sodium sulphate increases markedly the amount of feces eliminated for some time after. When given by mouth this salt increases the amount of feces to an even greater extent.—*Journ. Biol. Chem., N. Y.*, 1907, v. 3, pp. 191-211.

Maberly (*Lancet*, London, Nov. 10, 1906) discusses the intestinal antiseptic value of sodium sulphate.—*Therap. Gaz.*, Detroit, 1907, v. 31, p. 111.

SODII SULPHIS.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907, 1908, p. 44) using excess of iodine solution find commercial samples to contain from 92 to 96 per cent of sodium sulphite.

Smith, E. E., is reported to have said that there was no evidence to show that the sulphites taken with the food as a preservative produced anemia, and that it was still a question whether any injurious action was exerted on the kidneys.

Wiley, Harvey W., discussed the paper of Doctor Smith, and said that manufacturers were constantly pleading the smallness of the dose of the preservative in extenuation of its use, but that the continuance of even small doses might occasion injury to the health. Doctor Wiley then cited facts to show the injuriousness of sulphites on the health.—*N. Y. M. J.*, v. 85, pp. 92–93.

SODII THIOSULPHAS.

Gutmann, A., discusses the titrimetric determination of thio-sulphates in the presence of sulphites, and reports a number of experiments.—*Ztschr. f. anal. Chem.*, Wiesb., 1907, v. 46, pp. 485–500.

Blome, Walter H., (com. on adulterations) reports on 3 samples: Contained, respectively, a large amount of potassium, some sulphite, and a little sulphide.—*Proc. Michigan Pharm. Ass.*, 1907, p. 70.

Philipp Röder (*Jahresbericht*, Wien, 1907, p. 93) reports examining 3 samples of sodium thiosulphate, 2 of which contained mechanical impurities and were rejected.

SPARTEINÆ SULPHAS.

Gordin, H. M., reviews the chemistry of sparteine, and the progress that has been made in our knowledge of its composition during the year 1905.—*Pharm. Rev.*, Milwaukee, 1907, v. 25, pp. 50–55.

Moureu and Valeur (*Compt. rend.*, 145, 1343–1345) report the results of their work on isosparteine, an isomer of sparteine.—*Chem. Abstr. Am. Chem. Soc.*, 1908, v. 2, p. 1010.

Demandre (*Gaz. d. hôp. de Toulouse*) makes a contribution to the study of the salts of sparteine and of periodide of sparteine. His conclusions are given in *Répert. de pharm. Par.* 1907, v. 19, pp. 250–252.

Maurel, E., discusses the influence of the paths of administration (gastric, hypodermic, intravenous, etc.) on the minimal lethal dose of sparteine sulphate.—*Compt. rend. Soc. de biol., Par.* 1907, v. 62, pp. 960–961. (See also under "Methods of Administration.")

McGuire (American Journal of Surgery, Feb., 1907) believes that he has accidentally discovered in sulphate of sparteine a valuable remedy for the prevention and treatment of postoperative suppression of urine.—Therap. Gaz., Detroit, v. 31, pp. 403-404.

Commenting on the announcement made by Dr. Stuart McGuire, that he has accidentally discovered in sparteine sulphate a drug of value to prevent postoperative suppression of urine, an editorial points out that if these observations are correct it gives the drug a more prominent place than it now holds. The pharmacology of this drug leaves us with the impression that there is room for much more good work.—Pacific Pharm., San Francisco, 1907-8, v. 1, p. 89.

SPIGELIA.

Henkel, Alice, describes and figures *Spigelia marilandica* L., commonly called pinkroot, Carolina pinkroot, Carolina pink, Maryland pink, Indian pink, starbloom, wormgrass, wormseed, and American wormroot.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 52-53.

Holm, Theo., discusses and describes, with illustrations, the internal structure of the stem and leaf of *Ruellia ciliosa*, Pursh., *Phlox ovata* L., and *Spigelia marilandica* L.—Am. J. Pharm. Phila., 1907, v. 79, pp. 51-56.

Stockberger, W. W., discusses and illustrates the drug known as pinkroot, the trade varieties, the identity of the chief substitutes, the minor adulterants and methods of distinguishing pinkroot from its substitutes.—Bull. Bur. Plant. Ind., U. S. Dept. Agric., 1907, No. 100, pp. 41-44. (See also Pharm. Rev., Milwaukee, 1907, v. 25, pp. 2-21, 34-47, 66-84, 97-107.)

A news note asserts that *Spigelia* is an efficient remedy for round worm, and is not poisonous if given with care. The patient should be kept without food for twelve hours or more before administering the drug in the form of liquid extract. The addition of senna makes the drug more efficient, and the mixture is not disliked by children.—Pharm. J. Lond., 1907, v. 25, p. 26.

SPIRITUS.

Stevens, A. B., presents a list of U. S. P. and N. F. spirits and gives the calculated percentage of alcohol by volume.—Pharm. Era, N. Y., 1907, v. 37, p. 202.

SPIRITUS ÆTHERIS COMPOSITUS.

Pettit, H. M., thinks that unless it can be shown that the heavy oil of wine is actually possessed of sedative properties the compound spirit of ether might well be deleted from the Pharmacopœia.—Proc. Missouri Pharm. Ass., 1907, p. 136.

SPIRITUS ÆTHERIS NITROSI.

Hemm, Francis, describes the process for preparing the U. S. P. spirit of nitrous ether and calls attention to some of the precautions that must be exercised in this connection.—*Proc. Missouri Pharm. Ass.*, 1907, pp. 107–109.

Dohme and Englehardt point out that the Ph. Ndl. applies Dietze's method for the estimation of ethyl nitrite with very good results, besides being short in manipulation it does away with the use of the nitrometer.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 378.

Coblentz, Virgil, outlines a test for the detection of denatured alcohol containing acetone in spirit of nitrous ether.—*Merck's Report*, N. Y., 1907, v. 16, p. 68.

Furbush, W. St. L., outlines a method, and describes and figures an apparatus for distilling nitrous ether. Also discusses a test and assay and figures and describes an ingenious nitrometer.—*Am. Drug-gist*, N. Y., 1907, v. 50, pp. 163–165.

Whitney, D. V., presents an inquiry into what is being dispensed as sweet spirit of nitre; 17 samples analyzed varied from 1.570 to 3.910 per cent of ethyl nitrite.—*Proc. Missouri Pharm. Ass.*, 1907, pp. 148–49.

Blome, Walter H., (com. on adulterations) reports the examination of 7 samples of spirit of nitrous ether which varied from 1.30 to 5.08 per cent of nitrous ether and points out that the reason for the deficiency is the fact that many pharmacists keep this preparation in large, partially filled clear glass bottles exposed to strong light.—*Proc. Michigan Pharm. Ass.*, 1907, p. 69.

The New York State Board of Health, Eastern Branch, reports 151 samples examined, 1 deficient.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 327.

Caspari, Chas. E., points out that there has always been a demand by pharmacists for an article which should be cheaper, and consequently manufacturers have supplied them with a spirit of ethyl nitrite labeled "3F" or "4F," and containing from 1 per cent to 3 per cent of ethyl nitrite. He asserts that large quantities of this weaker spirit of nitrous ether are still being sold.—*Proc. Missouri Pharm. Ass.*, 1907, p. 142.

Sayre, L. E., reports on a sample of sweet spirit of nitre with a specific gravity of 0.952, which was acid in reaction, liberated a little CO_2 from NaHCO_3 ; did not boil at 65°C ., and yielded 0.04 per cent ethyl nitrite, in place of 4 per cent required by the U. S. P. VIII.—*Bull. Kansas Bd. Health*, 1907, p. 110.

Gilmour, J. P., thinks that a solution of ethyl nitrite would be more satisfactory than the spirit. The latter, however, with reason-

able precautions, can be maintained of official strength.—*Pharm. J. Lond.*, 1907, v. 25, p. 110.

The annual report of the local government board of England and Wales points out that of 232 samples examined 62 were found to be adulterated or not up to the standard.—*Chem. & Drug, Lond.*, 1907, v. 71, p. 828.

SPIRITUS FRUMENTI.

F. I. D. 65, issued April 12, 1907, presents the opinion of Attorney-General Charles J. Bonaparte bearing on the labeling of whisky, blends, compounds, and imitations thereof.

Ladd, E. F., discusses the definition for whisky that has been adopted in North Dakota, and reports on a number of examinations that have been made, giving the names of the legal as well as the illegal samples examined.—*Rep. North Dakota Exper. Sta.*, 1907, Part II, pp. 32-34, 43-58.

An editorial calls attention to some of the evidence that has been collected with reference to the whisky question and expresses some doubt as to the reliance that may be put in the claim that alcohol in a straight whisky is a good thing to drink while alcohol plain is not.—*Drug Topics*, New York, 1907, v. 22, pp. 33-35.

Crampton and Tolman (*Lab. Bur. Int. Rev. J. Am. Chem. Soc.*, 30, 98) made a study of the changes taking place in whisky stored in wood, and give the conclusions drawn therefrom.—*Chem. Abstr. Am. Chem. Soc.*, 1908, v. 2, p. 685.

Schidrowitz, Philip, discusses the estimation of higher alcohols ("fusel oil") in distilled liquors. His conclusions favor the Allen-Marquardt process; he thinks the Roese process most unreliable and sometimes quite impossible.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 561-566.

Baird, J. W., (com. on adulterations) reports on 8 samples, 2 genuine, 6 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

Lythgoe, Hermann C., reports 6 samples of whisky out of 7 examined as being adulterated.—*Rep. Massachusetts Bd. Health*, 1907-08, p. 385.

Ladd, E. F., asserts that more than 70 per cent of all the whiskies sold in the State of North Dakota are illegal under the present food law.—*Proc. North Dakota Pharm. Ass.*, 1907, p. 58.

Charteris and Cathcart discuss the physiological action of whisky on the circulation, and state that very little is known of the various wines and spirits as compared with that of pure alcohol.—*Brit. M. J.*, 1907, v. 1, p. 1174.

SPIRITUS GLYCERYLIS NITRATIS.

Dohme and Englehardt suggest that an assay method should be given for spiritus glycerylis nitratis based on the saponification of the glyceryl nitrate by alcoholic caustic potash.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 381.

Persson, Clöes, discusses the valuation of nitroglycerin and outlines methods for qualitative as well as quantitative determination.—*Svensk farm. Tidskr.*, 1907, v. 11, pp. 56–57.

Bernegau, Henry, found spirit of nitroglycerin to vary considerably and points out the need for determining the strength of this preparation. He also points out that in the manufacture of tablets the loss of nitroglycerin appears to be in the granulation process and that the tablets themselves are fairly constant.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 555.

Dohme, A. R. L., reports that observations made in his laboratory appear to indicate that tablets of nitroglycerin do not deteriorate perceptibly in course of time. Samples that were examined periodically during the past five years have not shown any marked deterioration.—*D.-A. Apoth.-Ztg.*, N. Y., 1907, v. 28, p. 133.

Vanderkleed, Charles E. (com. on adulterations), points out that nitroglycerin solution generally assays 8 or 9 per cent of glyceryl trinitrate, and suggests the gasometric method for testing.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 86.

Herringham, W. P., states that the nitrites, including nitroglycerin, do some good in the treatment of arterial sclerosis, but their effect is usually transient.—*Brit. M. J.*, 1907, v. 1, p. 63.

Lisin, F., discusses the uses of trinitrifi as a vaso dilator and reviews some of the literature.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, p. 484.

Snader, Edward E., (Medical Counselor) asserts that in an aged person where it is necessary to use an additional stimulant to the heart he has had good results from nitroglycerin given in 1/100 gr. doses during a critical period.—*Hahnemann. Month.*, Phila., 1907, v. 42, p. 153.

Kinyon, C. B., points out that the use of glonoin in diseases of women is in some respects similar to belladonna except that it has a pale face, the cerebral congestion is very intense, but the pelvic pain generally continues for two or three hours after the flushing and headache are relieved. It is often a very valuable remedy during the climactic.—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 385.

Additional references on the use of spirit of glyceryl trinitrate will be found in the *Index Medicus* and the *J. Am. M. Ass.*

SPIRITUS VINI GALLICI.

Kayser and Demolon report a study of the effect of the method of fermentation of the wine on the composition of the brandy.—*Compt. rend. Acad. d. sc., Par.*, 1907, v. 145, pp. 205–214.

Ladd, E. F., points out that there is little or no brandy on the market that will meet the official requirements as to age.—*Proc. North Dakota Pharm. Ass.*, 1907, p. 57.

Lythgoe, Hermann C., reports one sample of brandy as being adulterated.—*Rep. Massachusetts Bd. Health*, 1907, 1908, p. 385.

Scoville, W. L., found all brandy colored with caramel. This is true of the imported as well as domestic brands.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 324.

STILLINGIA.

Henkel, Alice, describes and figures *Stillingia sylvatica* L., commonly called stillingia, queen's-delight, queen's-root, silverleaf, and mettle-potato.—*Bul. Bur. Plant Ind., U. S. Dept. Agric.*, 1907, No. 107, pp. 47–48.

Watkins commends stillingia liniment, both as an external application and internally in croup.—*Eclectic M. J. Cincin.*, 1907, v. 67, p. 114.

STRAMONIUM.

Remington, Joseph P., reports that the U. S. P. standard for Stramonium is now 0.25 per cent of mydriatic alkaloids. Fluid extract of Stramonium now 0.25 gramme alkaloids in 100 cc. Extract of Stramonium now 1 per cent alkaloids. Tincture of Stramonium now 0.025 gramme alkaloids in 100 cc.—*Am. J. Pharm. Phila.*, 1907, v. 79, p. 135.

Peltriset, C. N., discusses the leaves of belladonna, stramonium and hyoscyamus, characters and microscopic diagnosis.—*Bull. d. sc. pharmacol. Par.*, 1907, v. 14, pp. 569–575.

Caesar and Loretz (*Geschäfts Ber.*, 1907, p. 94) record the requirements of the Ph. Austr. as permitting 20 per cent of ash. The U. S. P. requirement for 0.35 per cent of mydriatic alkaloids has been reduced to 0.25 per cent.

Hankey, W. T., has assayed lots of stramonium which fell as low as 0.14 per cent; the average of the better lots running close to 0.25 per cent of mydriatic alkaloids.—*Am. Druggist, N. Y.*, 1907, v. 50, p. 9.

Sayre, L. E., reports on 6 assays of stramonium, which yielded from 0.26 to 0.44 per cent of alkaloids. Average, 0.35 per cent.—*Bull. Kansas Bd. Health*, 1907, p. 44.

Caspari, Chas. E., (com. on adulterations) examined 3 samples, all weak.—*Proc. Missouri Pharm. Ass.*, 1907, p. 147.

Vanderkleed, Charles E., reports 19 assays of stramonium leaf, ranging from 0.157 to 0.620 per cent. Points out that reduction of standard to 0.25 was probably a wise one.—Proc. Pennsylvania Pharm. Ass., 1907, p. 90.

Kline and Graham report a sample of stramonium which assayed only 0.056 per cent of mydriatic alkaloids. They conclude that these leaves were not derived from *Datura stramonium*.—*Ibid.*, p. 86.

Bloyer is of the opinion that the use of opiates has blinded the profession to a degree as to the value of other and safer narcotics; in this connection he discusses the action and uses of stramonium.—Eclectic M. J. Cincin., 1907, v. 67, pp. 155–157.

STRONTII BROMIDUM.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 45) estimated one sample by titration which showed a purity of 99.85 per cent. The solution was neutral, and barium and iodides practically absent.

Robinson, William J., presents a clinical study of the bromine compounds with special reference to strontium bromide, which he believes the best of all the inorganic bromine compounds.—Tr. Am. M. Ass. Sec. Pharm. and Therap., 1907, pp. 80–92.

Bennion, J. M., used strontium bromide for the treatment of epilepsy in the insane, and believes that it has certain advantages over other bromides; rashes occur less frequently, there is less depression, and it controls the fits better.—Lancet, Lond., 1907, v. 172, pp. 19–20.

An editorial discusses the use of strontium bromide in the treatment of epilepsy, and points out that it has been frequently observed that strontium bromide acted better in controlling the number and the severity of the attacks than the mixed bromides of potassium and sodium.—Med. Rec., N. Y., 1907, v. 71, p. 608.

STRONTII IODIDUM.

Mitchell, Edward, asserts that at present no strontium iodide, U. S. P., is offered by local chemical houses. His firm is supplying U. S. P. purity, but not in crystal form, which the Pharmacopœia requires.—Proc. Arkansas Pharm. Ass., 1907, p. 91.

STROPHANTHINUM.

Thoms, H., reviews some of the more recent contributions on the action and uses of strophanthin and the variation in activity that is evidenced by the several strophanthins now available. He suggests the use of the following:

g.—Strophanthin=Strophanthin from *Strophanthus gratus*.

h.—Strophanthin=Strophanthin from *Strophanthus hispidus*.

k.—Strophanthin=Strophanthin from *Strophanthus kombé*.

e.—Strophanthin=Strophanthin from *Strophanthus emini*.

—Pharm. Ztg., Berl., 1907, v. 52, pp. 699–700.

Gehe & Co. (Handels-Bericht, 1907, p. 82) point out that g-Strophanthin, the active principle derived from *Strophanthus gratus*, is destined to replace the more or less variable tincture of strophanthus. The action appears to be uniformly reliable, and the appearance of the cumulative action is more quickly noted than with digitalin.

An unsigned article reviews the origin and production of ouabain, an amorphous glucoside from the *Acocanthera schimperi*, which is identical with the so-called crystalline strophanthin.—Am. Druggist, N. Y., 1907, v. 50, p. 102.

Fraenkel, A., discusses the intravenous injection of strophanthin in connection with the treatment of acute insufficiency of the heart.—Therap. d. Gegenw., Berl., 1907, v. 48, pp. 56–58.

v. Krehl, L., discusses the intravenous injection of strophanthin in various heart affections, reports a number of cases, and describes his technique.—Arch. f. exper. Path. u. Pharmakol., 1907, v. 57, pp. 79–122.

Fraenkel & Schwartz (Arch. f. exper. Pathol. u. Pharmakol., v. 57, pp. 79–122) report their observations with the intravenous injection of strophanthin.—Jahresb. ü. Tier. Chem. Wiesb., 1907, v. 37, p. 786.

Edmunds, Charles Wallis, presents a study on the action of strophanthin on the velocity of the blood current in dogs.—Am. J. Physiol., Boston, 1907, v. 18, pp. 140–144.

For additional references on the use of strophanthin see Index Medicus and J. Am. M. Ass.

STROPHANTHUS.

Meyer, Arthur, reviews some of the recent literature relating to strophanthus, the variation in the activity of *Strophanthus kombé* and the proposed substitution of the *gratus* or *hispidus* variety. He concludes that the introduction of either of these varieties would be of no advantage at the present time and that it would be preferable to improve on the character of the *S. kombé*.—Arch. d. Pharm., 1907, v. 245, pp. 351–359.

Mank-Mylan, Paul, criticises some of the statements made by Meyer which he considers reflect discreditably on the present day status of the German apothecary.—*Ibid.*, v. 245, pp. 554–557.

Meyer, Arthur, replies at some length.—*Ibid.*, v. 245, pp. 558–560.

Rusby, H. H., believes that most of the strophanthus seed imported is spurious.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 333.

Friedländer, Richard, reviews the history of strophanthus, its introduction by Fraser and its use as a cardiac tonic.—Therap. Monatsh., Berl., 1907, v. 21, pp. 175–176.

Caesar and Loretz (Geschäfts Ber., 1907, pp. 55–57) discuss the economic conditions prevailing in connection with strophanthus and review the several tests that have been proposed. They (pp. 107–

110), outline their qualitative and quantitative tests for the estimation of strophanthin content.

Philipp Röder Wien, points out that the sulphuric acid test for the identity of strophanthus should not be omitted and that at least several seeds in each lot should be so tested to guard against possible contamination with other seeds.—Pharm. Post., Wien, 1907, v. 40, p. 376.

Dohme, A. R. L., believes that all samples of strophanthus should respond to the sulphuric acid test. *Kombé* seed he believes to be preferable to the *hispidus* variety.—D.-A. Apoth.-Ztg., N. Y., 1907, v. 28, p. 133.

Hankey, William T., reports rejecting a shipment of strophanthus because the cheaper and unofficial variety, *Strophanthus hispidus*, was sent out instead of the official *Strophanthus kombé*.—Proc. Pennsylvania Pharm. Ass., 1907, p. 71.

Philipp Röder (Jahresbericht, Wien, 1907, p. 115) reports on 6 samples of strophanthus which varied from 3.75 to 4.40 per cent of ash and yielded from 12.33 to 20.05 per cent of alcohol extract.

Niece, Frederic E., outlines and describes a color reaction which he suggests for testing the identity of tincture of strophanthus.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 484.

The committee of reference in pharmacy points out that the proposed international standard for tincture of strophanthus is nearly four times as strong as that now official in the Ph. Brit., and that the great difference in the dosage might produce very untoward results.—Chem. & Drug., Lond., 1907, v. 70, p. 587.

Greenish, Henry G., points out that the International Agreement requires a tincture made by percolating with 70 per cent alcohol seeds not previously defatted; strength 1 in 10, weight in weight. All the pharmacopœias agree, but the United States Pharmacopeia requires weight in volume and directs a somewhat weaker menstruum.—Pharm. J., Lond., 1907, v. 24, p. 832.

Cæsar and Loretz (Geschäfts Ber., 1907, p. 73) point out that the tincture of strophanthus appears to be a permanent preparation. A sample three years old tested physiologically, gave practically the same results as when first made.

Philipp Röder Wien, reports that a number of samples of tincture of strophanthus examined exceeded the 1 per cent requirement for extract of the Ph. Austr. VIII, and points out that the pharmacopœia should caution against diluting a tincture that happens to be rich in extractive.—Pharm. Post., Wien, 1907, v. 40, p. 376.

Hatcher, R. A., calls attention to the fact that strophanthus has not rivaled digitalis, despite the theoretical advantages, and quotes Heinz, who states that strophanthus fell into disfavor in Germany soon after its introduction, owing to the variability. Hatcher cites

his experiments to show that the tincture of strophanthus, as sold in the shops of New York, is quite uniform in potency.—*J. Am. M. Ass.*, 1907, v. 48, pp. 1177–1179.

Additional references on the use of strophanthus will be found in the *Index Medicus* and the *J. Am. M. Ass.*

PULVIS ACACLÆ COMPOSITUS N. F.

Beringer, George M., objects to the use of *Pulvis Gummosus G. P.* as a synonym for *Pulvis Acaciæ Compositus N. F.*, as the ingredients of the two preparations are present in different proportions.—*Proc. New Jersey Pharm. Ass.*, 1907, p. 75.

PULVIS CRETÆ AROMATICUS N. F.

Caldwell, Paul, says that 1 ounce of aromatic powder of chalk, with opium, contains 12 grains of powdered opium.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 205.

Beringer, George M., points out that aromatic powder of chalk is not similar to the "*pulvis cretæ aromaticus*" of the *Ph. Brit.*, despite the similarity of the title and the misleading statement in the footnote.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 364.

PULVIS EFFERVESCENS COMPOSITUS.

Patch, E. L., examined 200 barrels which contained traces of chloride and traces of sulphate; several, traces of iron; 10 not thoroughly mixed. Samples from different portions of the barrels assayed differently; otherwise were U. S. P. Sample of seidlitz powder mixture contained 45.88 per cent of sodium bicarbonate instead of 25.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, p. 330.

Scoville, W. L., found the separate administration of the acid and alkaline seidlitz powders successful in many cases of headache where the ordinary headache powder proved nonefficacious. He states that a seidlitz powder yields about a pint and a half of carbon dioxide at the body temperature, and it is his opinion that this gas is an effective corrective of stomach disorders.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 227.

PYROGALLOL.

MacGowan, Granville, states that pyrogallic acid may be used in the form of a paste or salve in the treatment of lupus when a salicylic-cresote plaster is not permissible. It is advised that 10 per cent of calomel be added to a 50 per cent paste of pyrogallic acid for the purpose.—*J. Am. M. Ass.*, 1907, v. 49, p. 741.

PYROXYLINUM.

De Mosenthal, H., presents some observations on cotton and nitrated cotton.—Chem. & Drug., Lond., 1907, v. 70, p. 546.

Lunge, G., (Z. angew. Chem. 29, 2051–2058) reviews the work accomplished since 1899 by him and his associates and pupils and by Bruley, Guttman, and Bersch.—Chem. Abstr. Am. Chem. Soc., 1907, v. 1, p. 908.

Blome, Walter H., (com. on adulterations) reports pyroxylin not entirely soluble.—Proc. Michigan Pharm. Ass., 1907, p. 70.

STRYCHNINA.

Gordin, H. M., reviews the several communications bearing on the chemistry of strychnine published in the year 1905.—Pharm. Rev., Milwaukee, 1907, v. 25, pp. 55–57.

Pozzi-Escot, Emm., describes a crystalline double iodide of bismuth and strychnine which is claimed to be a very good means of recognizing the latter microchemically.—Ann. de chim. analyt., Par., 1907, v. 12, p. 357.

Warren and Weiss discuss the use of picrolonic acid as a precipitant for strychnine, and describe and figure strychnine picrolonate.—J. Biol. Chem., N. Y., 1907, v. 3, p. 334.

Welborn, G., points out the need for a simplified and abbreviated method of analysis for the detection of strychnine and outlines a method which he believes will materially shorten the completion of the analysis.—Pharm. J., Lond., 1907, v. 25, p. 639.

An editorial calls attention to the death caused by a mixture of liquor strychninæ and liquor arsenicalis of the Ph. Brit., and points out the desirability of using an acid solution of arsenic with potent alkaloids.—*Ibid.*, v. 25, p. 568.

Elborne and Warren discuss the toxicology of strychnine and present a number of illustrations showing the characteristic contractions of the claws of birds poisoned by strychnine.—*Ibid.*, v. 24, p. 776.

Jacobj, C., discusses the cause for the paralyzing action of strychnine and reports a number of observations from which he concludes that Schmiedeberg's conception of a specific, central paralyzing action of strychnine is probably correct.—Arch. f. exper. Path. u. Pharmacol., 1907, v. 57, pp. 399–414.

Sherrington, C. S., discusses the action of strychnine on the reflex inhibition of skeletal muscle, and records a number of experiments.—J. Physiol., Lond., 1907, 1908, v. 36, pp. 185–204.

French, J. M., discusses the action and uses of strychnine as compared with hydrastine.—Merck's Arch., N. Y., 1907, v. 9, p. 105–107.

Additional references on the use of strychnine will be found in the Index Medicus and the J. Am. M. Ass.

STRYCHNINÆ SULPHAS.

Vecray, F. L., (Gaz. Med. Belg.) points out that the Ph. Belg. III directs that strychnine nitrate be dispensed in place of the sulphate, because the former is stable while the latter loses five molecules of water of crystallization on exposure to the air.—Pharm. Era, N. Y., 1907, v. 37, p. 107.

STYRAX.

Gausby, R. A., reports that all samples of styrax examined were of satisfactory quality, with the exception that each contained a larger proportion of water than allowable.—Proc. Pennsylvania Pharm. Ass., 1907, p. 76.

Graham, Willard, examined two samples of styrax which contained, respectively, 70 per cent and 69 per cent of alcohol soluble matter.—*Ibid.*, p. 238.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 44) state that this substance is still subjected to much adulteration and give the results of their examination of five samples, which ranged from 24 to 77 per cent in proportion of petroleum ether extract; from 95 to 100 acid value; from 5.5 to 26 per cent water content, and from 0.1 to 1.5 per cent in ash. Three were 3.9, 5.7, and 4.5 per cent insoluble in 90 per cent alcohol; two contained fatty deposit, and three contained 20, 15, and 7 per cent of cinnamic acid. The cinnamic acid was estimated by saponification and crystallization from water, but such good results have been obtained by the bromine absorption method that they intend experimenting further in this direction.

SULPHONETHYLMETHANUM.

Cohn, Walter, calls attention to the danger of administering hypnotics in the form of tablets and advises the administration of this class of medicaments in the form of solution or mixture.—Apoth. Ztg. Berl., 1907, v. 22, p. 147.

Gabutti, E., points out that the presence of sulphonal in trional or tetronal may be detected by taking advantage of its comparative insolubility in ether. 10 cc. of ether will completely dissolve 0.5 gm. of trional, 1 gm. of tetronal, and only 0.07 gm. of sulphonal. Sulphonal may subsequently be identified by suitable reagents and the determination of its melting point, 125.5° C.—J. de Pharm. et de chim., Par., 1907, v. 25, pp. 483-486.

SULPHONMETHANUM.

Smith, H. Carlton, questions why the name antipyrin is retained and "sulphonal" rejected. Sulphonal is, or was five years ago, official in the Ph. Brit., and is much easier than the semiscientific

names used by our revisers of 1900. The exact chemical names for complex hydrocarbon derivatives are not practicable. Sulphonal is a diethyl-sulphon-dimethyl-methane. This name gives us a definite idea of its constitution, which the abbreviated name in the Pharmacopœia gives but imperfectly.—Dental Cosmos, Phila., 1907, v. 49, p. 847.

Wood, Horatio C., jr., states that owing to our peculiar patent laws sulphonal, costing 77 cents per pound in England, costs \$21.60 per pound here. Wood cites other instances where such discrepancies prevail.—J. Am. M. Ass., 1907, v. 49, p. 349.

Gabutti, Emilio, outlines a method of detecting sulphonal in trional or tetronal by taking advantage of the greater solubility of the latter two in ether.—Boll. chim. farm., Milano, 1907, v. 46, pp. 533-535.

Dücker discusses the soporific action of alkyl radicles and reviews the pharmacodynamic properties of a number of synthetic hypnotics, including sulphonal and trional.—Pharm. Ztg. Berl., 1907, v. 52, p. 970.

SULPHUR SUBLIMATUM.

An unsigned article presents an interesting account of the sulphur industry of the world and the influence that has been exerted by the recent development of the Louisiana sulphur mines on the Sicilian sulphur industry.—Oil, Paint and Drug Reporter, N. Y., 1907, v. 72, Oct. 7, p. 16.

A news note presents some figures in connection with sulphur statistics of the world, and points out that these figures indicate an increase of 50 per cent in the quantity and of 33 per cent in the value of the production of sulphur in the United States for 1906; the increase being from 181,677 long tons in 1905 to 293,153 tons in 1906.—*Ibid.*, v. 72, p. 50.

An unsigned article discusses the sulphur production in Louisiana, and quotes Frasch, who asserts that prior to the operation of the Louisiana mines only one-half of 1 per cent of the sulphur was produced in this country. Now, we are exporting to Europe more than the Sicilians have been shipping here, and we are furnishing all the sulphur used in the United States—the largest sulphur consuming country in the world.—Paint, Oil & Drug Rev., Chicago, 1907, v. 44, December 11, p. 16. (See also *Ibid.*, v. 44, August, 14th, p. 24.)

An editorial discusses the Cove Creek Sulphur Beds, Utah, and points out that the ore varies in richness from a trace to practically pure sulphur. Material running as low as 15 per cent sulphur is considered paying ore. At the smelter, the ore is placed in iron retorts and the sulphur is melted out by steam. The resulting product

as it comes from the retorts has been found to contain 99.71 per cent of sulphur, 0.23 per cent nonvolatile residue, and 0.06 per cent of moisture.—*Ibid.*, v. 43, Mch. 6, p. 25.

An editorial (*L'industria chimica*, v. 7, pp. 78–79) makes a brief statement concerning the present status of the sulphur industry in Sicily.—*Chem. Abstr. Am. Chem. Soc.*, 1907, v. 1, p. 1460.

A review of the sulphur industry of Japan includes a table giving the amount and the value of sulphur exported during the years 1902–1906.—*Chem. Ind., Berl.*, 1907, v. 30, p. 403.

Berger, M., outlines a method for the rapid transformation of sulphur into sulphuric acid in the determination of metallic sulphur.—*Bull. de la Soc. de chim. de France, Par.*, 1907, v. 1, pp. 194–195.

Kastle and McHargue report on the combustion of sulphur in air and oxygen.—*Am. Chem. J.*, 1907, v. 38, pp. 465–475.

McCrea and Wilson (*Chem. News*, July 19, 1907, 25) have made experiments which showed that at temperatures below 255° C. sulphur refused to ignite, but that at temperatures above 255° C. ignition easily took place.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 253.

Hill J. Rutherford, discusses the igniting point of sulphur and reports some additional experiments which indicate that the igniting point of sulphur is about 255° C.—*Pharm. J. Lond.*, 1907, v. 24, p. 357.

Ruff and Graf discuss the behavior of sulphur with water and the vapor pressure of sulphur from 78–210° C.—*Ber. d. deutsch. chem. Gesellsch.*, 1907, v. 40, III, pp. 4199–4205.

Erdmann, Hugo, presents a contribution to our knowledge of the chemistry of sulphur in which he discusses the ring-like combinations assumed by this element under certain conditions, and the existence of an active form of sulphur as thiozone, S₃.—*Ann. d. Chem. Leipz.*, 1907, v. 362, pp. 133–137.

Klose, G., reports that adeps lanæ dissolves 0.37 per cent of sulphur.—*Arch. internat. de Pharmacod. et de Thérap.*, 1907, v. 17, p. 461.

Gilmour, J. P., found 76 samples to be of Ph. Brit. standard. If Squire's statement be correct, that commercial sublimed sulphur is always more or less acid, and that only "washed sulphur" fulfills the Ph. Brit. requirement as to freedom from acidity, he thinks the majority of the samples must have been of the latter variety.—*Year Book Pharm., Lond.*, 1907, pp. 446–450.

Stich, Conrad, discusses the keeping qualities of sulphur ointment, and describes and figures crystalline forms of sulphur observed in ointments and similar preparations.—*Pharm. Ztg., Berl.*, 1907, v. 52, pp. 789–790.

Riecke, E., suggests the following method as producing the most stable and efficient ointments: Sulphur is precipitated from a thoroughly chilled solution of calcium polysulphide and triturated after washing, while still moist, with the ointment base (anhydrous wool fat, according to Stich). Obtained in this way the ointment, which the author proposes to designate as *Pasta Sulfuris Pultiformis*, has proven therapeutically very efficient and to possess marked stability.—*Ibid.*, v. 52, p. 1059.

Ellis, W. H., has found that if sulphur is placed upon a small smooth board and rubbed with a spatula, it can be incorporated with the lard easily, and a very smooth ointment free from coarse particles is the result. A piece of common oak board, 10 by 12 inches in size and sand papered on one side, is just the thing.—*Bull. Pharm.*, Detroit, 1907, v. 21, p. 164.

Frick, Daisy A., (*Bull. Pharm.*, Detroit, 1907, v. 21, p. 338) makes the following suggestion, which facilitates the incorporation of the sulphur in ointments: First, triturate the sulphur in a dry mortar, then carefully triturate with just sufficient glycerin to form a smooth paste, which is easily accomplished. The base is then added in small quantities at a time, and a fine, smooth ointment results.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 138.

Blackwood, A. L., points out that sulphur has an extensive clinical record in the treatment of what the older observers termed "scrofula."—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 486.

Kinyon, C. B., points out that sulphur is the great remedy for persons tainted with psora. In these cases it seems to set the system in running order till other remedies will work. Give a dose early in the morning.—*Ibid.*, p. 393.

Fornias, Eduardo, outlines a scheme for the study of sulphur, gives a résumé of the role of sulphur in the economy and of the changes this organogenic element suffers in normal and abnormal conditions. Also discusses the general action of sulphur as a drug.—*Hahnemann. Month.*, Phila., 1907, v. 42, pp. 657-669; 837-849.

SULPHUR PRÆCIPITATUM.

Brownlee, R. H., has studied precipitated sulphur with the purpose of investigating the relation between the proportion of amorphous sulphur found in a given sample of precipitated sulphur and the conditions under which the precipitation and hardening of the sulphur took place.—*J. Am. Chem. Soc.*, 1907, v. 29, pp. 1032-1052.

Gausby, R. A., reports that several samples of precipitated sulphur examined contained large amounts of calcium sulphate, but that there is no difficulty in procuring the U. S. P. article.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 79.

Brown, Geo. S., reports that of 16 samples of precipitated sulphur examined, only 1 was found to be pure. Although precipitated was asked for, sublimed sulphur was dispensed in three cases. Eight samples each contained 50 per cent of calcium sulphate.—*Proc. Louisiana Pharm. Ass.*, 1907, p. 80.

Blome, Walter H., (com. on adulterations) reports on 3 samples of precipitated sulphur containing 45.89, 58.0, and 59.90 per cent of calcium sulphate, respectively.—*Proc. Michigan Pharm. Ass.*, 1907, p. 71.

Caspari, Chas. E., (com on adulterations) examined 10 samples; 8 satisfactory, 2 contained 40 per cent to 50 per cent calcium sulphate.—*Proc. Missouri Pharm. Ass.*, 1907, p. 143.

Baird, J. W., (com. on adulterations) reports on 14 samples, 5 genuine, 9 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

SUMBUL.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of sumbul as 71.0, 72, 80, 55, and 80 per cent, respectively.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 319.

SUPPOSITORIA.

An unsigned article discusses the making of suppositories of various kinds, the care of the mold, the preparation of extempore molds, and the basis or vehicle to be used.—*Pharm. J. Lond.*, 1907, v. 25, pp. 311-312; 336-337.

Keller, Charles, (*Bull. Pharm. Aug.*, 1907, 378) finds that in making cacao butter suppositories by the cold process, the addition of lanolin results in a better working mass than can be obtained by the addition of castor oil or glycerin.—*Proc. Am. Pharm. Ass.*, 1908, v. 56, p. 122.

Shroeder, G. H., finds that in making suppositories which contain drug extracts, he can get the best results by first rubbing the extracts down with glycerin and alcohol, afterwards melting the cacao butter by placing the dish in hot water. By this method the cacao butter does not get hot enough to burn the extracts.—*Bull. Pharm.*, Detroit, 1907, v. 21, p. 209.

Buskey, C. K., observes that in making suppositories containing a granular powder much difficulty is experienced in rolling and shaping the mass. The suppositories tend to crumble, especially when they become too cold. This difficulty can be overcome by adding two grains of petrolatum to each suppository.—*Ibid.*, v. 21, p. 338.

Lane, T. T., finds that the addition of a little petrolatum to the grated cacao butter facilitates the formation of a plastic mass,

which can be easily worked and shaped by hand, and is preferable, on a hot day, to mixing the melted fat with the ingredients in the customary manner. For dusting the suppositories when rolling them out he uses wheat flour, which gives them a much neater appearance than dry lycopodium.—*Ibid.*, v. 21, p. 338.

SUPPOSITORIA GLYCERINI.

Blair, Henry C., outlines his method for making glycerin suppositories and points out that the advantages over the official preparation are a lower melting point, greater solubility, firmer consistency, and, as there is much less water than in the official preparation, they are more hygroscopic.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 156.

SYRUPUS.

Eberle, A. R., suggests that syrup be made from crushed sugar to avoid the presence of ultramarine, which he believes to be the cause of the slightly disagreeable odor frequently met with in syrups made with granulated sugar.—*Proc. Wisconsin Pharm. Ass.*, 1907, p. 67.

Mittelbach, Wm., believes that the second method of making medicinal syrups without the aid of heat is the better one, and should in the next revision be the primary process.—*Proc. Missouri Pharm. Ass.*, 1907, p. 131.

Nixon, C. F., recommends the use of rock candy in making medicinal syrups.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, p. 148.

Thurston, Azor, outlines the following method for determining the percentage of sugar in syrup: Into a sugar flask place 26.048 grams of the syrup, make up to 100 cc. with water, polarize in a 200 mm. tube at 25° C., and the reading on the sugar scale will give the direct percentage of sugar in the syrup, which should be 64.5 per cent.—*Merck's Rep.*, N. Y., 1907, v. 16, p. 124.

Baird, J. W., (com. on adulterations) reports on 2 samples, 1 genuine, 1 adulterated.—*Proc. Massachusetts Pharm. Ass.*, 1907, p. 40.

SYRUPUS ACIDI HYDRIODICI.

Lane, P. S., examined 8 samples of syrup of hydriodic acid, which varied from 0.44 to 1.18 per cent of hydriodic acid.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 366.

SYRUPUS ACETÆ COMPOSITUS N. F.

Beringer, George M., says this title should be changed to Syrupus Cimicifugæ Compositus.—*Ibid.*, v. 79, p. 360.

SYRUPUS AURANTII.

Dunning, H. A. B., believes that syrup of orange would be better without the citric acid.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 131.

SYRUPUS CHONDRI COMPOSITUS N. F.

Caldwell, Paul, says that one ounce of compound syrup of Irish moss contains one-eighteenth grain of powdered opium and 3 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 204.

SYRUPUS COFFEE N. F.

Scoville, W. L., states that in the preparation of syrup of coffee, N. F., much depends upon keeping the vessel well covered during the boiling and cooling. There should be only enough vent to partially relieve the pressure. If a high-grade coffee is used, the addition of 12 grams of chicory will improve it, notwithstanding the prejudice against chicory in coffee. For the cheaper coffees, a trace of coumarin will be an improvement. Only a trace should be used, varying somewhat with the grade of the coffee. When properly adjusted, the coumarin reinforces the coffee flavor without itself being noticeable. It should be borne in mind that this preparation is not intended for a beverage, but is used as a flavor in emulsions, etc., and a too delicate flavor is not desirable; it must have enough of the coarser qualities to make it effective as a disguise for unpleasant tastes.—*Ibid.*, v. 51, p. 295.

SYRUPUS FERRI CITRO-IODIDI N. F.

Stevens, A. B., points out that the N. F. formula for syrup of citro-iodide of iron has been changed in each edition and is still unsatisfactory. He proposes to increase the amount of water used to wash the filter, and to remove any free iodine formed by treating with starch.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 153.

SYRUPUS FERRI IODIDI.

The Ph. Helv. IV directs the use of powdered iron in the making of syrup of iodide of iron and 0.05 per cent of citric acid as a preservative.—Pharm. Ztg., Berl., 1907, v. 52, p. 893.

Ranzoli, Giuseppe, discusses the preparation and the analysis of syrup of ferrous iodide and calls attention to the wide variation in the composition of this syrup existing before the adoption of the 5 per cent standard by the Brussels' Conference. Boll. chim. farm., 1907, v. 46, pp. 610-615.

Rupp and Koat describe a method for determining the iodine content of syrup of ferrous iodide by decomposing the iodide by means

of sulphuric acid, liberating the iodine by an excess of potassium permanganate and titrating with sodium thiosulphate solution.—Suedd. Apoth. Ztg., 1907, v. 47, p. 244.

Beringer, George M., points out that the note (formerly) under Solution of ferrous iodide N. F., is not correct as the diluted hypophosphorous acid is far below that required by the U. S. P. formula for syrup of ferrous iodide. Am. J. Pharm., Phila., 1907, v. 79, p. 363.

Beckwith, C. P., points out that syrup of ferrous iodide made from the N. F. solution of ferrous iodide in accordance with the instructions in the note (formerly) appended to the N. F. formula will fall short of the U. S. P. requirements.—Bull. Pharm., 1907, v. 21, p. 78.

Bachman, Gustav, (Com. on Adulterations) reports syrup of ferrous iodide ranging from 4.8 per cent to 3.1 per cent, instead of 5 per cent as required by the U. S. P.—Proc. Minnesota Pharm. Ass., 1907, p. 41.

SYRUPUS FERRI, QUININÆ ET STRYCHNINÆ PHOSPHATUM.

Cohn, Alfred I., asserts that it is rather difficult to see why a special preparation of the phosphate of iron, quinine, and strychnine should have been necessary to add to the list of U. S. P. preparations just for the purpose of making one syrup, which can be very simply made by a modification of his proposed formula for the elixir of the phosphates of iron, quinine, and strychnine.—Am. Druggist, N. Y., 1907, v. 51, p. 5.

Raubenheimer, Otto, points out that Cohn's formula does not yield a preparation containing the three salts as phosphates, and adds that Easton's syrup should be recognized as a synonym by the U. S. P. This preparation darkens if kept on hand because the free acid present will caramelize the sugar.—*Ibid.*, p. 70.

Mittelbach, William, can see no necessity for a syrup of iron, quinine, and strychnine compound; the elixir ought to fill the wants of those prescribing such a compound.—Proc. Missouri Pharm. Ass., 1907, p. 132.

SYRUPUS GLYCYRRHIZÆ N. F.

Scoville, W. L., states that a better flavored preparation of syrup of licorice N. F., can be made by percolating ground licorice root with a weak (0.1 per cent) solution of ammonium carbonate, evaporating the 50 cc. and dissolving 850 gms. of sugar in the liquid. This also makes a lighter colored preparation.—Drug. Circ., N. Y., v. 51, p. 295.

SYRUPUS HYDROCHLOROPHOSPHATUM N. F.

Beringer, George M., thinks this title a misnomer not warranted by the contained materials.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 360.

Nitardy, F. W., presents a new formula for this preparation in which the amount of sugar is reduced from 525 gms. to 425 gms. for 1,000 cc. of the finished syrup. He has found it impossible to prepare this syrup according to the N. F. directions and outlines an improved method of procedure.—*Bull. Am. Pharm. Ass.*, Chicago, 1907, v. 2, p. 381.

SYRUPUS HYPOPHOSPHITUM.

Mittlebach, William, believes that the formula for simple syrup of hypophosphites is a splendid one. It now has the requisite amount of sugar to preserve it.—*Proc. Missouri Pharm. Ass.*, 1907, p. 132.

SYRUPUS HYPOPHOSPHITUM COMPOSITUS.

Goode, W. C., discusses several formulas for compound syrup of hypophosphites, and presents type formulas for a colorless syrup, a neutral syrup, and a cloudy syrup.—*Bull. Pharm.*, 1907, v. 21, pp. 102-104. (See also p. 210 for corrected "typical formulas.")

Goldby and Finnemore discuss the preparation of the compound syrup of hypophosphites of the B. P. C., also discuss a formula by Harold, and present an alternate and more expeditious process for the preparation of the B. P. C. formula.—*Pharm. J. Lond.*, 1907, v. 24, p. 102.

SYRUPUS IPECACUANHÆ ET OPII N. F.

Caldwell, Paul, says that 1 ounce of syrup of Dover's powder contains 4 grains of powdered opium and 2 per cent of alcohol.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 204.

SYRUPUS MORPHINÆ SULPHATIS N. F.

Caldwell, Paul, points out that 1 ounce of syrup of morphine sulphate contains 1 grain of morphine sulphate.—*Ibid.*, v. 51, p. 205.

SYRUPUS PAPAVERIS N. F.

Beringer, George M., points out that the note under the formula for syrup of poppy N. F. is misleading.—*Am. J. Pharm.*, Phila., 1907, v. 79, p. 365.

SYRUPUS PECTORALIS N. F.

Caldwell, Paul, points out that 1 ounce of pectoral syrup contains one-fourth grain of morphine hydrochloride.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 205.

SYRUPUS PHOSPHATUM COMPOSITUS N. F.

Dunning, H. A. B., asserts that the compound syrup of the phosphates becomes turbid on standing, probably due to the presence of citric acid and a soluble calcium salt.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 131.

SYRUPUS QUINIDINÆ N. F.

Scoville, W. L., states that in the preparation of syrup of quinidine N. F., if the mucilage of acacia is at all acid the bitterness will be developed. The amount of saccharin solution directed is also too large, in his judgment. It should be omitted altogether.—Drug. Circ., N. Y., 1907, v. 51, p. 295.

SYRUPUS PINI STROBI COMPOSITUS N. F.

Caldwell, Paul, points out that 1 ounce of compound syrup of white pine contains one-fourth grain of morphine sulphate, 3 minims of chloroform, and 7 per cent of alcohol.—*Ibid.*, v. 51, p. 205.

SYRUPUS PICIS LIQUIDÆ.

An answer to a correspondent points out the changes that have been made in the formula for syrup of tar during the last three revisions of the U. S. P., and suggests that while the now official may be stronger in tar it has the disadvantage of the presence of alcohol.—*Ibid.*, v. 51, p. 263.

See also under the several drug headings.

TARAXACUM.

Henkel, Alice, describes and figures *Taraxacum officinale* Weber, also known as *Taraxacum taraxacum* (L.) Karst., and *Taraxacum dens-leonis* Desf., commonly called dandelion, blowball, cankerwort, doon-head clock, fortune teller, horse gowan, Irish daisy, yellow gowan, and one-o'clock.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 60–61.

An unsigned article points out that the present shortage of taraxacum is due to a rather unique feature of American drug business, and is the direct result of an advertising campaign in connection with a new proprietary medicine.—Chem. & Drug., Lond., 1907, v. 70, p. 485.

Abstracts from articles by Chiron and by De Cooman call attention to the usefulness of taraxacum in a variety of conditions such as gastralgia, cephalgia, and other painful affections. Painful sensitiveness in all the limbs, especially the touch and to improper position. Feeling of malaise and weakness in the whole body. Chilliness with pressing headache. Irresolution and aversion to work.—Hahnemann. Month., 1907, v. 42, p. 148.

TEREBENUM.

Southall's Report (1907, 33) says that the official requirements for terebene can not be met in practice. Two lots recently prepared from American turpentine oil had the following characters: Sp. Gr. 0.853 and 0.956; distillate below 165° C., 1 per cent in each; distillate between 165–180° C., 97 and 92 per cent.—Year Book Pharm., Lond., 1907, p. 159.

TEREBINTHINA CANADENSIS.

Perrot, E., says the original drug is transparent, citron yellow, of the consistence of thick honey or only slightly fluid; but when it becomes dry, as is the commercial form, there are added to it foreign resins, yet we wonder at our vexations in its micrographic use.—Bull. d. sc. pharmacol., Par., 1907, v. 14, p. 351.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 14) report a small consignment giving normal values (acid value 77, saponification value (hot) 86.8) which refused to become brittle after dissipation of volatile matter. It was not entirely soluble in alcohol. Another sample gave practically identical figures and was found to be satisfactory.

TERPINI HYDRAS.

Hommell, P. E., thinks the N. F. elixir of terpin hydrate with or without codeine should find its way into the U. S. P.—Proc. New Jersey Pharm. Ass., 1907, p. 63.

TALCUM.

Blome, Walter H. (Com. on Adulterations) says that talcum varies greatly as to the amount of grit, degree of fineness and whiteness, and number of shiny scales.—Proc. Michigan Pharm. Ass., 1907, p. 71.

THYMOL.

Schimmel & Co. (Semi-Ann. Rep., October, 1907, p. 104) note the following requirements for thymol in the new Ph. Dan.: colorless, transparent crystals; melting point, 51–52°; boiling point 228–230° C.; completely volatile at the temperatures of the water bath. Molten thymol floats on water; crystallized thymol sinks in it. Soluble in 1,100 volumes of water, very readily in alcohol, ether, and chloroform, also in 2 volumes caustic soda liquor (containing 10 per cent NaOH). Identity reactions and test for carbolic acid. Schimmel & Co. suggest that the melting point lies between 50.5 and 51.5° C., and that it boils between 233 and 234° if the mercury thread of the thermometer is placed entirely in the steam.

Welker, William H., discusses the effects of certain antiseptics used for the preservation of urine with respect to the influence they exert upon analysis. He calls attention to a disturbance in the acetone test when applied to urine containing thymol, and states that while the presence of thymol does not wholly destroy the value of the iodoform test for acetone in urine, it certainly increases the difficulty.—N. Y. M. J., 1907, v. 86, pp. 552–553.

Cousin and Hérissé (Journ. Pharm. Chim., 1907, 26, 473) assert that when the oxydase of fungi is allowed to act on thymol, the product is not a simple body. From the products of the reaction dithymol has been isolated, so that the process of oxidation, as in the case of morphine and vanillin, is accompanied by condensation. The other products formed are probably quinones; they are insoluble in caustic soda. They have been obtained in a crystalline condition, and may be condensation products of more complex molecular structure than dithymol.—Pharm. J. Lond., 1907, v. 24, p. 745.

Ashford and King discuss Uncinariasis, its development, course, and treatment, and state that thymol was used by them in many cases without a case of poisoning from it. They believe it to be preferable to betanaphthol, which was also found serviceable.—J. Am. M. Ass., 1907, v. 49, pp. 471–476.

THYMOLIS IODIDUM.

Duliere, Walter, discusses the determination of the iodine content of thymol iodide and points out that the preparation, as available, is not always satisfactory.—Ann. de pharm. Louvain, 1907, v. 13, p. 417.

Patch, E. L., examined one lot containing 1.8 per cent of alkaline iodide.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 331.

TRAGACANTHA.

Nelson, Burt E., discusses the nature and origin of tragacanth and describes its powder.—Merck's Report, N. Y., 1907, v. 16, p. 192.

Vamvakas, Jean, says this gum presents no reaction, either in the cold or heat, with Nessler's reagent; if tartaric acid be added before turning in the Nessler reagent, and if it be carried to the boiling point, there is produced a turbid, dirty orange color which deposits.—Ann. de chim. analyt. Par., 1907, v. 12, p. 13.

Gausby, R. A., points out that there is a great variation in the quality of tragacanth. He reports on 7 lots of powdered tragacanth, all of nice white appearance, which when made into a mucilage (1 in 50) and tested empirically for viscosity, making the highest sample as 100, varied as follows: 100, 80, 24, 22, 12, 8, 6.—Proc. Pennsylvania Pharm. Ass., 1907, p. 75.

Vanderkleed, Charles E., (com. on adulterations) asserts that much of the powdered tragacanth on the market is adulterated with either powdered acacia, or starch, or both. He outlines a test.—*Ibid.*, p. 87.

TINCTURÆ.

Greenish, Henry G., believes that the adoption of a uniform standard for the tinctures of potent drugs, as proposed in the protocol of the Brussels Conference, is open to serious objection, as the strength of some, notably strophanthus, is so great as to render accurate dosage a matter of difficulty, whilst in others, as cantharides, the proportion of active constituent is so large as to approach perilously near to the limit of its solubility in the menstruum employed.—*Pharm. J., Lond.*, 1907, v. 24, p. 833.

Bührer, C., points out that much of the disagreement in the U. S. P. from the international protocol is due to the nature of the menstruum and the fact that preparations are made to measure in place of weight.—*Schweiz, Wehnschr. f. Chem. u. Pharm. Zürich*, 1907, v. 45, p. 419.

Hannay, T., points out that the Ph. Helv. IV has adopted in their entirety the international standards for all of the potent tinctures, except in the case of tincture of opium which is still being made by maceration and not by percolation.—*Chem. & Drug., Lond.*, 1907, v. 71, p. 617.

Cleland is reported as suggesting that many tinctures may best be made by a process of fractional maceration.—*Pharm. J., Lond.*, 1907, v. 24, p. 61.

An editorial reviews a recent discussion by Herzog on the comparative value of maceration *versus* percolation, and points out that the results proved that percolation has a direct economic advantage over maceration, 100 grams of tincture prepared by the former being equal to 115 grams of the latter.—*Chem. & Drug., Lond.*, 1907, v. 70, p. 34.

Niece, Frederic E., discusses the identification of tinctures by chemical means and outlines identity tests for a number of preparations.—*Proc. Am. Pharm. Ass.*, 1907, v. 55, pp. 479-484.

An abstract reviews an article by Engström, who proposes to add a capillarity test for determining the identity of tinctures and other liquid preparations.—*Am. Druggist, N. Y.*, 1907, v. 50, p. 225.

Alcock, F. H., reports experiments to determine the strength and general physical characters of tinctures. The physical tests include the amount of total solids per cent w/v, the specific gravity and the alcoholic strength. He gives a table containing the total solids and ash of a number of tinctures.—*Pharm. J. Lond.*, 1907, v. 25, pp. 738-739.

Philipp Röder (Jahresbericht, Wien, 1907, p. 11) suggests that for determining the extract content of tinctures and fluid extracts 10 gms. of the preparation be placed in a tared dish of about 5 cm. in diameter and dried for three hours at a temperature of 100° C. The resulting dried extract multiplied by 10 gives the extract content in 100 gms. of the original preparation.

Feil, Joseph, calls attention to an advertisement in a drug journal advising the dilution of fluid extracts as a convenient and satisfactory method of making U. S. P. tinctures, and points out some reasons why this practice should not be followed.—Proc. Ohio Pharm. Ass., 1907, pp. 34–36.

Cotton, S. (D. Apoth. Ztg.), reports observations on the amount of alcohol retained in drug residues left after exhausting the drug by maceration. As would be expected, spongy drugs like bitter orange peel were found to retain a greater amount of alcohol than hard drugs such as nux vomica.—D.-A. Apoth.-Ztg., N. Y., 1907, v. 28, p. 100.

Stevens, A. B., presents a list of U. S. P. and N. F. tinctures, giving the percentage of alcohol by volume.—Pharm. Era, N. Y., 1907, v. 37, p. 202.

Caldwell, Paul, points out that 1 ounce of ethereal tincture of ferric chloride contains 2 drams of ether and 68 per cent of alcohol.

One ounce of Warburg's tincture contains one-fourth grain of powdered opium and 57 per cent of alcohol.

One ounce of pectoral tincture contains 2 grains of powdered opium and 50 per cent of alcohol.—Drug. Circ., N. Y., 1907, v. 51, p. 205.

TRITICUM.

Henkel, Alice, describes and figures *Agropyron repens* (L.) Beauv., *Triticum repens* L., commonly known as dog-grass, quick-grass, quack-grass, quitch-grass, quake-grass, scutch-grass, twitch-grass, witch-grass, wheat-grass, creeping wheat-grass, devil's-grass, durfa-grass, Durfee-grass, Dutch-grass, Fin's grass, and Chandler's grass.—Bul. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 12–13.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of couch grass as 23.7, 24, 25, 25, and 15 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

ULMUS.

Evans Sons Lescher and Webb (Analytical Notes, 1907, 1908, p. 41) report American-ground bark which exhibited very much more starch (in the form of minute rounded grains) than formerly. They are assured that no sophistication has taken place, and as the starch

can not be referred to any other source with which they are familiar the contention of the shippers that the starch is natural to bark of southern habitat is probably correct.

Hommell, P. E., thinks *Mucilago Ulmi* should be dropped, as it is scarcely ever called for.—Proc. New Jersey Pharm. Ass., 1907, p. 62.

UNGUENTA.

Runge, Paul, in an interesting and comprehensive review of "Doctor Unna's Magistral Formulas" calls attention to the fact that Unna invariably directs that the fats used for the preparation of his ointments and pastes shall be benzoinated, not with benzoic acid, however, as is the usual direction in Ph. Germ. IV, but with benzoin, and emphasizes that the superiority of benzoin as a preservative of fats and oils is fully confirmed by his own experience.—Pharm. Ztg., Berl., 1907, v. 52, p. 535.

A correspondent (W.) of the *Apotheker Zeitung*, referring to Runge's strictures concerning the relative value of benzoin and benzoic acid for the preservation of fats states that his experience coincides with that of Runge. He has, for example, for the last twenty years benzoinated mutton suet by melting 1 kgm. with 10 gm. of benzoin (which he finds sufficient) and the container (a wooden box) to-day smells as sweet as when it was first put to use for this purpose.—Apoth. Ztg., Berl., 1907, v. 22, p. 580.

McMillan, A., presents some formulas and discusses the changes in ointments made with parenol as described by John Humphrey in the *Pharmaceutical Journal* of December 8.—Pharm. J. Lond., 1907, v. 24, p. 5.

v. Rijn, W., (*Pharm. Weekbl.*, 1907, No. 51) recommends the following simple method of determining the fat in ointments, which lends itself with particular advantage to the examination of ointments and pastes containing boric acid, mercury, zinc oxide, starch, etc.: 1 gm. of the ointment is weighed on paper and shaken with the paper with 50 cc. of petroleum ether. After subsidence the solution is filtered and 10 cc. of the filtrate are evaporated; the residue is dried at 100° to 105° C. and weighed.—Proc. Am. Pharm. Ass., 1908, v. 56, p. 134.

An unsigned article discusses the dispensing of ointments and the preparation of ointments with solid active ingredients, with liquid active ingredients, with active ingredients soluble in the basis, and the general precautions necessary in connection with the making of ointments.—Pharm. J. Lond., 1907, v. 25, pp. 242-243.

Emelin, E. J., gives some useful hints concerning the dispensing of ointments. To fill an occasional collapsible tube with a salve, roll the salve in a piece of waxed paper, place one end of this roll into

the tube opening and squeeze the ointment into the tube until it begins to issue from the small opening, then screw on the caps and seal the tubes in the usual way.—Apothecary, Boston, 1907, v. 19, p. 186.

UNGUENTUM.

Hess, Paul L., would prefer yellow wax instead of the white in the formula for ointment on account of its better keeping qualities. As it is, the ointment will become rancid in a comparatively short time, even if kept under the most favorable conditions.—Proc. Missouri Pharm. Ass., 1907, v. 138.

Over the signature of "K. -Lüdenscheld i. W.," the simple ointment of the Ph. Germ. is criticised unfavorably and a mixture of 1 part of anhydrous wool fat and 2 parts of yellow American vaseline prepared on the steam bath recommended as being an ideal substitute. It is emollient, homogeneous, odorless, stable, and capable of taking up 100 per cent of water.—Pharm. Ztg., Berl., 1907, v. 52, p. 179.

UNGUENTUM ACIDI BORICI.

Koehler discusses the production and the uses of antiseptic ointments, particularly of boric acid ointment, and concludes that the latter is permissible as 1—a mixture of 10 per cent of boric acid with petrolatum, yielding an ointment that does not irritate, but is useful only as a protection. 2—a boroglycerin lanolin ointment containing 10 per cent of boric acid which is antiseptic and because of its water content also cooling.—Schweiz. Wchnschr. f. Chem. u. Pharm., Zürich, 1907, v. 45, pp. 30-31.

UNGUENTUM DIACHYLON.

Lascoff, J. Leon, finds that the best way to prepare diachylon ointment is to melt the lead plaster and olive oil and strain through cheese cloth into a mortar. Rub well, and add a few drops of water. This will turn out a nice, soft, white color; otherwise it will be of a brownish color and not soft.—Apothecary, Boston, 1907, v. 19, p. 186.

UNGUENTUM HYDRARGYRI.

Greenish, Henry G., points out that the international agreement required 30 per cent of mercury. All the pharmacopœias comply except the United States, which retains a 50 per cent ointment.—Pharm. J. Lond., 1907, v. 24, p. 833.

Bührer, C., points out that the U. S. P. requires a 50 per cent ointment of mercury in place of the 30 per cent ointment of other pharmacopœias, in accordance with the Brussels Conference.—Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 419.

Michelon, M. E., discusses the history of mercurial ointments, and records a number of formulas for the preparation dating back to the early portion of the sixteenth century.—Bull. de la Soc. de pharm. de Bordeaux, 1907, v. 47, 46–50, 84–92, 97–107.

Brasington, G. E., recommends as an expedient for the convenient and quick extinction of mercury globules, to vigorously agitate the required quantity of metal with an *equal volume* of compound tincture of benzoin in a bottle. The minutely divided mercury, which results almost immediately, may then be incorporated with the fat (preferably lanolin slightly warmed) with a minimum of labor.—Bull. Pharm., Detroit, 1907, v. 21, p. 512.

Dunning, H. A. B., expresses the belief that a better U. S. P. mercurial ointment could be made if anhydrous lanolin were used as the extinguishing agent.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 131.

Mitchell, Edward, asserts that when his firm first took up the subject of mercurial ointment some years ago, a leading manufacturer informed them that no half-mercury ointment contained more than one-third mercury, and that one-third mercury was 25 per cent trade usage.—Proc. Arkansas Pharm. Ass., 1907, p. 91.

Baird, J. W., (com. on adulterations) reports on 7 samples; 1 genuine, 6 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 40.

Scoville, W. L., reports samples which tested 47.7 per cent to 49.2 per cent mercury, but the lowest test samples show presence of appreciable quantity of mercury oxide.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 327.

Deming, Ralph, believes that as a therapeutic measure in the treatment of syphilis, the inunction method is the best, but because of its many objectionable features it is of comparatively little value in private practice.—Hahnemann. Month., Phila., 1907, v. 42, p. 429.

UNGUENTUM HYDRARGYRI AMMONIATI.

Schnabel, C., believes that the ointment of ammoniated mercury is best prepared from the freshly precipitated mercury compound, with the addition possibly of a small proportion of wool fat.—Apoth. Ztg. Berl., 1907, v. 22, p. 1119.

Vörner, H., (from Deutsch. med. Wchnschr., 1907, No. 10) recommends that white precipitate ointment be prepared, similarly to the yellow mercuric oxide ointment, by incorporating the fat with freshly ammoniated mercury while in a moist condition. A good ointment is obtained by incorporating the calculated quantity of the mercurial compound in well drained magma direct with vaseline.—Pharm. Ztg., Berl., 1907, v. 52, p. 222.

UNGUENTUM HYDRARGYRI DILUTUM.

Hess, Paul L., thinks that this dilute preparation is a good addition to the Pharmacopœia, as an ointment of this strength has been dispensed for years in place of the 50 per cent preparation.—Proc. Missouri Pharm. Ass., 1907, p. 139.

UNGUENTUM HYDRARGYRI NITRATIS.

The inspectors of pharmacies assert that the ointment of mercuric nitrate is frequently badly prepared or has undergone decomposition. Samples were found that had a brown tint, others were gray.—Ann. de pharm., Louvain, 1907, v. 13, p. 377.

UNGUENTUM HYDRARGYRI OXIDI FLAVI.

The Ph. Helv. IV formula for the ointment of yellow oxide of mercury directs the use of a freshly prepared mercuric oxide mixed with wool fat and vaseline.—Pharm. Ztg., Berl., 1907, v. 52, p. 893.

At the Congress of Pharmaceutical Chemists in Milan the following formula was proposed for inclusion in the New Italian Pharmacopœia: Yellow mercuric oxide, 5 gm.; wool fat, 5 gm.; vaseline, 90 gm. The mercuric oxide is freshly precipitated, washed with water, then with alcohol and alcohol-ether, and finally with ether. While moist, it is triturated with the wool fat, then heated on the water-bath until the ether is exaporated, and lastly mixed with the vaseline.—(Rep. de Pharm., 1907, No. 11.) Proc. Am. Pharm. Ass., 1908, v. 56, p. 137.

Guyot, M. R., discusses the preparation of ointment of yellow oxide of mercury, the cause of irritation, and the conservation of the ointment.—Bull. de la Soc. de pharm. de Bordeaux, 1907, v. 47, pp. 71-78.

Schnabel, C., recommends that the ointment of yellow mercuric oxide be made with freshly precipitated mercuric oxide.—Apoth. Ztg. Berl., 1907, v. 22, p. 1119.

UNGUENTUM IODI.

Schultze, Louis, proposes the following solution of iodine to be used (10 minims to 1 gm. of benzoinated lard) for the extemporaneous preparation of the U. S. P. iodine ointment:

Powdered iodine.....	62 grains.
Potassium iodide.....	62 grains.
Glycerin.....	
Distilled water aa. q. s.....	280 minims.

—Proc. Maryland Pharm. Ass., 1907, p. 49.

UNGUENTUM PHENOLIS.

Hess, Paul L., does not think that the use of white petrolatum in place of the U. S. P. ointment in the ointment of phenol is an improvement.—Proc. Missouri Pharm. Ass., 1907, p. 140.

UNGUENTUM POTASSII IODIDI.

Rupp and Kost (Pharm. Ztg., 1907, No. 13) outline a method for the determination of the iodide in the ointment of potassium iodide; that is not influenced by the presence of chloride or bromide ions that may be present. The method depends on the liberation of the iodine present by an acid solution of potassium permanganate and titration with thiosulphate solution.—Schweiz. Wchnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, p. 153.

UNGUENTUM RESORCINI COMPOSITUM N. F.

St. James, J. C. Arthur, reports his experience in making compound ointment of resorcin and suggests melting the paraffin, petrolatum, and wool fat in the order named, adding the oil of cade, and then gradually adding these to the powders in a large mortar and triturating till cool; by this process he invariably secures a perfect mixture.—Bull. Pharm., 1907, v. 21, p. 163.

UNGUENTUM VERATRINÆ.

Cohn, Alfred I., asserts that it is a settled axiom in making ointments that, wherever possible, solid substances should be incorporated in the form of solution. For making unguentum veratrinx he suggests that the alkaloid be dissolved in a very small quantity of alcohol, to this a little castor oil is added, which is then stirred until the alcohol has evaporated, after which the benzoinated lard is added. To adapt the procedure to the U. S. P. formula, it is only necessary to dissolve the veratrine in a little ether or chloroform, in both of which it is quite soluble, this solution made with the expressed oil of almond, and then triturated as above.—Am. Druggist, N. Y., 1907, v. 51, p. 6.

UNGUENTUM ZINCI OXIDI.

Baird, J. W., (com. on adulterations) reports on 19 samples, 12 genuine, 7 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 40.

UVA URSI.

An unsigned article quotes Stevens, Caldwell, and three manufacturers as giving the percentage of alcohol in the official fluid extract of uva ursi as 19.0, 19, 40, 30, and 35 per cent, respectively.—Drug. Circ., N. Y., 1907, v. 51, p. 319.

VALERIANA.

An unsigned article asserts that preparations made from the fresh root of *Valeriana officinalis* are more active than those of the dried root, and points out that Chevalier has recently examined the fresh juice and found it to contain an alkaloid, a glucoside, and a resinous substance, all of which are physiologically active. The alkaloid and the glucoside undergo a change or become volatilized during process of drying.—Am. Druggist, N. Y., 1907, v. 51, p. 46.

Chevalier, J., presents a paper on the pharmacodynamic action of a new alkaloid contained in the root of fresh valerian.—Compt. rend. Acad. d. sc. Par., 1907, v. 144, pp. 154-157.

VANILLA.

An unsigned article outlines the method of preparing vanilla for the market and compares the resulting product with vanillin, which latter the writer believes to be preferable for sanitary reasons.—Nat. Druggist, St. Louis, 1907, v. 37, p. 13.

An editorial discusses the production of vanilla in the Seychelles Islands, and points out that owing to the present low prices for this article the economic conditions in these islands are unsatisfactory.—Chem. & Drug., Lond., 1907, v. 70, p. 935.

Simon, Maurice, presents a compilation in tabular form of the total production of vanilla during the years 1901 to 1906. The production of Mexican vanilla for 1905 and 1906 is estimated as 200,000 kilograms.—Tropenpflanzer, Berl., 1907, v. 11, 871.

Major, William, outlines the following method for preparing tincture of vanilla from Bourbon vanilla beans: Macerate the beans in boiling water for one-half hour, then add a sufficient quantity of dilute alcohol. The boiling water destroys the bitter taste characteristic of the Bourbon beans, and the tincture then produced compares well with a tincture made from the Mexican vanilla.—Bull. Pharm., Detroit, 1907, v. 21, p. 249.

The Massachusetts State Board reports on 6 samples of tincture of vanilla; 3 were below standard.—Proc. Am. Pharm. Ass., 1907, v. 55, p. 331.

VANILLINUM.

An unsigned article discusses the status of vanillin under the food and drugs act and the permissibility of using it in flavoring extracts. Vanillin is said to approach as near to the ideal of sanitary perfection as is humanly possible.—Nat. Druggist, St. Louis, 1907, v. 37, pp. 13-14.

Spurge, E. C., discusses the chemistry of vanillin, its history and uses, and gives an outline of its method of manufacture.—Am. Druggist, N. Y., 1907, v. 50, p. 223.

Kebler, Lyman F., says the synthetic production of vanillin undoubtedly was one of the greatest scientific achievements and triumphs of chemistry. Vanillin is a very valuable commodity, but should be exploited as such, and not disguised to take the place of extract of vanilla and deprive the latter of its time-honored reputation.—J. Frankl. Inst., Phila., 1907, v. 163, p. 310.

Roesler, A., outlines a method for preparing vanillin from guaiacol.—Pharm. Ztg., Berl., 1907, v. 52, p. 893.

VERATRINA.

Fetterolf, Daniel W., discusses the application of the Lloyd reaction to mixtures of hydrastine and veratrine, and concludes that veratrine gives no characteristic reaction with the Lloyd reaction for alkaloids.—Am. J. Pharm., 1907, v. 79, p. 323.

Busquet and Pachon discuss the influence of veratrine on the form of cardiac pulsation, contribution to the study of cardiac tetanus.—Compt. rend. Soc. de biol., Par., 1907, v. 62, pp. 913-946, 1220-1222. (See also article by Busquet. J. de physiol. et de path. gen., Par., 1907, v. 9, pp. 50-54.)

VERATRUM.

Henkel, Alice, figures and describes *Veratrum viride* Ait., also known as true veratrum, green veratrum, American veratrum, green hellebore, swamp-hellebore, big hellebore, false hellebore, bear-corn, bugbane, bugwort, devil's bite, earth gall, Indian poke, itchweed, tickleweed, duckretter.—Bull. Bur. Plant Ind., U. S. Dept. Agric., 1907, No. 107, pp. 18-19.

An editorial points out that veratrum viride yields a number of proximate substances, alkaloidal and resinous, but to none of these substances does any recognized authority ascribe the value of veratrum.—Paint, Oil, and Drug Review, Chicago, 1907, v. 43, May 8, p. 25.

Puckner, W. A., reviews the communication by Bredemann on the estimation of alkaloids in veratrum, and outlines his process.—Pharm. Rev., Milwaukee, 1907, v. 25, p. 331.

Hirst, John C., is reported to have said that the routine treatment of eclampsia at the University of Pennsylvania Maternity Hospital consisted of chloroform to avert attack if possible, veratrum viride fluid extract hypodermically, lavage of the stomach and the introduction of castor oil, with hypodermoclysis of salt solution, veratrum viride being used for recurring convulsions.—N. York M. J., 1907, v. 85, p. 764.

Norris, Richard C., is reported to have said that veratrum is useful in moderate doses in case of sudden onset of eclampsia, the doses to

be frequently repeated until the pulse is slowed. In some cases it would be contraindicated, and it should be used with caution.—*Ibid.*, v. 85, p. 765.

Powers, H. W., discusses the physiological action and therapeutic indications of veratrum.—*Eclectic M. J.*, v. 67, pp. 83–84.

Buchanan, Drysdale T., asserts that veratrum viride acts as a powerful heart sedative.—*Tr. Am. Inst. Homœop.*, 1907, 63d session, p. 619.

Kinyon, C. B., points out that one of the most striking characteristics of veratrum album is that before, during, and following menstruation there is great sexual excitement. It is looked upon by many as the chief anchor in the treatment of puerperal eclampsia, but it certainly does possess the power of restoring the secretion of milk and the lochial discharge, and subduing to a great extent the inflammation surrounding the uterus and ovaries.—*Ibid.*, p. 394.

Additional references on the use of veratrum will be found in the Index Medicus.

VIBURNUM PRUNIFOLIUM.

Francis, John M., has seen some lots of black haw gathered from the wrong part of the shrub, and also some samples which were collected from the wrong species.—*Proc. Pennsylvania Pharm. Ass.*, 1907, p. 63.

Philipp Röder (Jahresbericht, Wien, 1907, p. 46) thinks the 5 per cent limit for ash, in the Ph. Austr. VIII, is too low. Only two samples examined were well within this limit, the remaining samples varying from 5.41 to 6.59 per cent.

VIBURNUM OPULUS.

Kinyon, C. B., discusses the uses of viburnum opulus, and points out that a valuable point of distinction between this and caulophyllum is that in cases of amenorrhœa or dysmenorrhœa the caulophyllum patient can not endure the pain but becomes frantic and almost delirious. There is a striking similarity. Both remedies are indicated in tall, slender, fair-haired, hysterical persons suffering from disorders of menstruation.—*Tr. Am. Inst. Homœop.*, 1907, 63rd Session, p. 395.

VINUM.

The methods for the analysis of wine as outlined by the Association of Official Agricultural Chemists provides for 24 determinations, including specific gravity, alcohol, glycerol, extract, ash, total acids, sugar, tannin, heavy metals, and nitrates.—*Bull. Bur. Chem., U. S. Dept. Agric.*, 1907, No. 107, pp. 83–89.

The official French methods for analyzing wines are reproduced. They include the determination of alcohol, extract, saccharose and dextrose, total acids, fixed acids, volatile acids, tartaric acid, potash, and ash.—Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, pp. 782–788.

Günther, Adolf., presents a compilation of the official statistics on the examination of wines in the German Empire during 1905–6.—Arb. a. d. Kais. Gsmdhts. Amte, Berl., 1907, v. 27, pp. 1–93.

Von der Heide, G., and others, present a compilation of the results of the official examination of must or new wine during the year 1905–6 in the several wine-producing countries of the German Empire.—*Ibid.*, v. 27, pp. 94–182.

Thurston, Azor, discusses the optical rotation of wines and quotes Bigelow on the behavior of the several commercial wines.—Merck's Report, N. Y., 1907, v. 16, p. 124.

Fisher, Ernst, discusses the determination of the weight per cent of alcohol in wines and presents data designed to facilitate the calculation of the weight percentage from the specific gravity of the wine and of the alcoholic distillate.—Chem. Ztg., Cöthen, 1907, v. 31, pp. 2–3.

Duboux and Dutoit outline a method for the determination of alcohol in wine, which depends on the determination of what they term the critical temperature of dissolution "C. T. D.," the temperature at which a mixture will mix homogeneously with a certain solution.—Schweiz. Wehnschr. f. Chem. u. Pharm. Zürich, 1907, v. 45, pp. 753–755.

Heidushka and Quincke discuss the quantitative determination of the more important acids found in wines, in addition to the alcohol and glycerin.—Arch. d. Pharm., 1907, v. 245, pp. 458–461.

Rocques, Z., notes that Feldman's proposed modification of the Neubauer-Löwenthal process for the estimation of tannin in wine, by replacing permanganate of potash by hypochlorite of lime, was indicated by Löwenthal in the 3^d edition of Fresenius (1875, p. 811). He thinks the permanganate has the advantage over the hypochlorite of keeping better, though according to the author the end of the operation is more easily recognizable with the hypochlorite.—Ann. de chim. analyt. Par., 1907, v. 12, p. 195.

Hubert and Alba discuss the detection of arsenic, copper, lead, and zinc in wines, giving three figures of apparatus employed.—*Ibid.*, v. 12, pp. 230–237.

Hubert discusses the estimation of manganese in wines.—*Ibid.*, v. 12, pp. 264–267.

Carles, P., contributes a note on the estimation of total tartaric acid in the tartars and lees of wines.—*Ibid.*, v. 12, p. 355.

An editorial discusses the dietetic value of wines, and quotes from a report on the effects produced on the physiological functions of the body by various beverages, recently published in the *Hospital*.—*Pharm. J. Lond.*, 1907, v. 24, pp. 802–803.

Scoville, Wilbur L., points out a number of desirable changes in connection with National Formulary preparations which he believes would tend to make them more palatable. He particularly recommends the addition of wines to some elixirs.—*Drug. Circ.*, N. Y., 1907, v. 51, p. 294.

The editor, in commenting on some of the proposed changes, thinks it well to avoid making medicines so palatable with wine that their use may be unnecessarily prolonged, or a taste for wine engendered.—*Ibid.*, v. 51, p. 294.

Hubaut, P., (*La Revue*) declares that it may be stated without fear of exaggeration that in Paris, and everywhere where the vine is not cultivated, *i. e.*, in half of France, and as regards more than half the consumption, the wine drunk is not pure wine and is not the juice of the grape.—*Brit. Food J.*, Lond., 1907, v. 9, p. 23.

The British Food Journal (Lond., 1907, v. 9, p. 114) notes that a royal decree has been issued by the Portuguese Government, the object of which is to prevent the sale, warehousing, and exportation of full-bodied wines under the denominations "Port," "Madeira," "Carcavellos," and "Setubal Moscatel," which are not actually the produce of Douro, Madeira, Carcavellos, and Setubal regions, respectively. Douro full-bodied wines must be exported from the bar of the Douro and from the port of Leixoes; Madeira from the port of Funchal; Carcavellos and Setubal Moscatel from the bars of the Tagus and Sado; or if these wines are shipped from any other port in the country they must be provided with a certificate of origin issued by the Oporto, Funchal, Lisbon, or Setubal customs-house, as the case may be. Further, the wines may only be exported by parties whose names are entered in the registers to be opened at the customs-houses of Lisbon, Oporto, and Funchal.

Additional references on the analysis of wine may be found in the Experiment Station Record and in Chemical Abstracts.

VINUM RUBRUM.

The Lancet Analytical Commission reports on the "Port wine and the vineyards of the Alto Douro."—*Lancet*, Lond., 1907, v. 173, pp. 1705–1714.

Guérin, G., presents a method of determination of total acidity and volatile acids in colored wines.—*J. de pharm. et de chim.*, Par., 1907, v. 25, pp. 491–492.

Jean and Frabot present a modification of Trillat's process for the precipitation, by means of formol, of the coloring matter of

red wine, which they claim to be more expeditious and satisfactory.—*Ann. de chim. analyt., Par.*, 1907, v. 12, p. 52.

Astruc, H., commends the process and comments on its range of applicability.—*Ibid.*, v. 12, p. 140.

Sabrazés and Marcandier (*Ann. de l'Institut. Pasteur, Paris*, v. 21, No. 4) report a series of experiments designed to show the bactericidal power of pure wine. Equal parts of contaminated water and pure white wine become sterile in six hours, while red wine and water require twelve hours, using typhoid bacilli.—*J. Am. M. Ass.*, 1907, v. 49, p. 192.

VIRUS VACCINICUM.

Schamberg, J. Frank, calls attention to the misuse of the term vaccination in opsono therapy. He states that in vaccination living organisms are introduced, but in bacterial inoculations toxins are introduced. Vaccine applies properly only to a subject related to the bovine species, from *vacca*, a cow. Much confusion will result if the distinction is not made.—*J. Am. M. Ass.*, 1907, v. 49, p. 259.

Nelson, Glenn M., records an extensive study on the bacteriological impurities in vaccine virus. He concludes that the vaccine virus of to-day is far more nearly sterile, and thereby more reliable as a preventive of the virulent smallpox.—*Pacific Pharm., San Francisco*, 1907-8, v. 1, pp. 93-96.

Camus, L., discusses the determination of the quantity of glycerin in the vaccine of Jenner. With three very small quantities of vaccine one may obtain very easily and rapidly by the method of Maurice Nicloux an indication of the proportion of glycerin.—*Compt. rend. Soc. de biol., Par.*, 1907, v. 63, pp. 211-213. (See also *J. de pharm. et de chim., Par.*, 1907, v. 26, p. 93.)

An editorial calls attention to the benefits of governmental supervision of vaccine virus, and states that the manufacturer is now required to examine each lot of vaccine virus to determine the freedom from pathogenic micro-organisms, with a special examination for tetanus.—*J. Am. M. Ass.*, 1907, v. 48, p. 1187.

An editorial discusses the uses of vaccination, and points out that the agitation of those who are opposed to vaccination may prove injurious.—*Critic and Guide, N. Y.*, 1907, v. 8, February, p. 3.

Dock, George, discusses compulsory vaccination, antivaccination, and organized vaccination; presents some statistics, and concludes that our present method, varying much in different States and different parts of the same State, make certain a high ratio of smallpox cases with an unduly low protection to the individual.—*Am. J. M. Sc., Phila.*, 1907, v. 133, pp. 218-233.

An editorial states that the advisory board of the department of health of Pennsylvania rules that three faithfully performed vacci-

nations at intervals of two weeks without taking are sufficient evidence that the patient is for the time being (estimated at one year) immune to smallpox. The editor cites that the proof is not convincing.—J. Am. M. Ass., 1907, v. 49, p. 780.

The contributor of the "Vienna Letter" quotes the statement of Professor Neuberger, in the *Wiener klinische Wochenschrift*, that the annual mortality from smallpox was 2,000 in Vienna, 70,000 in Germany, and 400,000 in Europe at the end of the eighteenth century, before the introduction of vaccination. Jenner's method became known in 1800 and as vaccination increased, the deaths from smallpox decreased to a remarkable degree.—*Ibid.*, v. 49, p. 1930.

Knoepfelmacher, Wilhelm, discusses the subcutaneous injection of cow-pox vaccine and reports a number of experiments and its uses as an immunizing and a diagnostic agent.—*Ztschr. f. exper. Path. u. Therap.*, 1907, v. 4, pp. 880-909.

Eaton, Charles Woodhull, presents the facts about variolinum, a virus which he asserts has been amply demonstrated to be an efficient preventive of smallpox. Of the 2,806 patients protected by variolinum, 547 were known to have been exposed to smallpox and 14 of the latter number were known to have acquired smallpox.—*Tr. Am. Inst. Homœop.*, 1907, 63d Session, pp. 547-561.

A number of references on vaccine and vaccination will be found in the *Index Medicus* and the *J. Am. M. Ass.*

ZINCI ACETAS.

Caspari, Chas. E., (com. on adulterations) examined 3 samples; 2 satisfactory, 1 contained chloride.—*Proc. Missouri Pharm. Ass.*, 1907, p. 147.

ZINCI CHLORIDUM.

Gilmour, J. P., found zinc chloride to be invariably basic.—*Year Book Pharm., Lond.*, 1907, pp. 446-455.

The inspectors of pharmacies assert that zinc chloride is frequently found decomposed or deliquesced, and suggest that it be kept in a desiccator.—*Ann. de pharm.*, Louvain, 1907, v. 13, p. 326.

MacGowan, Granville, mentions the use of zinc chloride for the cauterization of the curetted surfaces in the mixed treatment of lupus. Moist dressings of boro-salicylic acid are then used.—*J. Am. M. Ass.*, 1907, v. 49, p. 741.

ZINCI OXIDUM.

Robinson, R. A., jr., points out that the *Codex* asserts that zinc oxide is never completely soluble in solution of ammonia, owing to imperfect combustion of the zinc from which it is prepared.—*Pharm. J., Lond.*, 1907, v. 25, p. 508.

Scott, W. G., discusses the properties of zinc oxide, its production and some of its uses.—*Paint, Oil, and Drug Rev.*, Chicago, 1907, v. 44, December 11, pp. 21–22.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907–8, p. 46) assert that up to 6 parts of arsenium per million is occasionally detected, and from 0.05 to 2 per cent of lead.

Caspari, Chas. E., (com. on adulterations) examined 8 samples; 6 satisfactory, 2 contained chloride.—*Proc. Missouri Pharm. Ass.*, 1907, p. 145.

Gilmour, J. P., found 25 samples to be of Ph. Brit. standard; he confirms Squire's experience that some are not entirely soluble in solution of ammonia.—*Year Book Pharm.*, Lond., 1907, pp. 446–455.

ZINCI PHENOLSULPHONAS.

Evans Sons Lescher and Webb (*Analytical Notes*, 1907–8, p. 46) report two lots which left 14.9 per cent and 15.08 per cent of oxide, respectively, upon ignition, and were practically free from all impurities except iron. The presence of traces of the latter appears to be common in this article.

ZINCI STEARAS.

Murray, Benjamin L., points out that zinc stearate of the U. S. P. containing a "small but varying proportion of zinc palmitate" must yield by one method of assay "about 13.5 per cent" of zinc oxide, and by another, better method, 14 to 16 per cent. Pure zinc stearate can only yield about 12.7 per cent and pure zinc palmitate about 14.1 per cent. It is plain that a mixture of them could not yield more than the palmitate alone, as required at present. About 12 to 15 per cent would be a requirement that could be met.—*Merck's Report*, N. Y., 1907, v. 16, p. 248.

Hankey, W. T., asserts that zinc stearate can be readily prepared and suggests that the *Pharmacopœia* contain a formula for its manufacture.—*Am. Druggist*, N. Y., 1907, v. 50, p. 9.

Blome, Walter H., (com. on adulterations) reports zinc stearate containing a trace of chloride.—*Proc. Michigan Pharm. Ass.*, 1907, p. 71.

ZINCI SULPHAS.

Alcock, F. H., describes an unusual sample of zinc sulphate, which has been brought to his attention and which had evidently effloresced. It was not entirely soluble in water, a translucent, jelly-like sediment remaining when a portion was put into distilled water, which, on the addition of a little hydrochloric, sulphuric, or nitric acid, quickly disappeared. It did not suit official requirements, and may

have suffered change during the drying process.—Pharm. J., Lond., 1907, v. 24, p. 6.

Blome, Walter H., (com. on adulterations) reports zinc sulphate containing an appreciable quantity of chloride.—Proc. Michigan Pharm. Ass., 1907, p. 71.

Caspari, Chas. E., (com. on adulterations) examined 10 samples, 8 satisfactory, 2 contained excess of chloride.—Proc. Missouri Pharm. Ass., 1907, p. 145.

Glaxelli, Stanislaus, presents observations on the theory of the H_2S precipitation of metals, particularly the action of hydrogen sulphide on zinc salts.—Ztsch. f. anorg. Chem., 1907, v. 55, pp. 297–320.

ZINGIBER.

Garnett and Grier report observations to determine the pungent principle of ginger; report their experiments in detail, and outline a simple test which enables one to distinguish between pure preparations and those fortified by the addition of capsicum.—Pharm. J., Lond., 1907, v. 25, pp. 118–120.

Gehe & Co. (Handels-Bericht, 1907, p. 47) discuss the production of ginger in various countries, and give a table showing the total production during the years 1905 and 1906.

Philipp Röder (Jahresbericht, Wien, 1907, p. 109) points out that the 5 per cent limitation for ash permitted by the Ph. Austr. VIII is unusually low, largely because the greater portion of the commercial drug is dusted with lime salts. When this added lime was removed by means of hydrochloric acid it was found that the ash content could be reduced from 6.2 to 2.90. Four samples of ginger examined varied from 5.70 to 7.44 per cent of ash.

Reich, R., discusses the examination of ginger and the detection of extracted ginger. He describes Cochin ginger, Japanese ginger, Bengal ginger, African ginger, and commercial powdered ginger, also outlines the factors that are to be determined.—Ztschr. f. Unters. d. Nahr. u. Genussm., 1907, v. 14, pp. 549–567.

McGill, A., (Lab. Inland Rev. Dept. Canada, Bul. 130, p. 13) examined 30 samples of ground ginger found in the Canadian market, 29 of which were genuine, while adulteration was not absolutely certain in the remaining sample.—Exp. Sta. Rec., 1907–8, v. 19, p. 968.

Winton, A. L., asserts that whole ginger during long storage is almost sure to be attacked by the drug-store beetle, which makes numerous burrows and finally converts the drug almost entirely into a disgusting powder.—Proc. Ass., Off. Agric. Chem., 1907, 24th Ann. Conv., p. 11. (Bull. Bur. Chem., U. S. Dept. Agric., 1908, No. 116.)

Baird, J. W., (com. on adulterations) reports on 17 samples, 9 genuine, 8 adulterated.—Proc. Massachusetts Pharm. Ass., 1907, p. 39.

Lythgoe, Hermann C., reports that of 15 samples of fluid extract of ginger examined, 7 were made with weak alcohol and consequently contained but little ginger oil and resin.—Rep. Massachusetts Bd. Health, 1907-8, p. 379.

Sayre, L. E., points out that a tincture of ginger made from the Jamaica variety of the root, when made into a 20 per cent tincture, will give an extract that will contain from 0.235 to 0.240 per cent of volatile oil. A 20 per cent tincture of African ginger will yield an extract that will contain from 0.40 to 0.45 per cent of volatile solids. He reports examining 2 commercial samples of essence of Jamaica ginger which were found to contain 0.36 and 0.226 per cent of volatile solids, respectively.—Bull. Kansas Bd. Health, 1907, p. 47.

Barnard, H. E., reports that of the 18 samples of tincture of ginger examined, 7 were pure and 11 below standard.—Rep. Indiana Bd. Health, 1907, p. 193.

LIST OF HYGIENIC LABORATORY BULLETINS OF THE PUBLIC HEALTH AND MARINE-HOSPITAL SERVICE.

The Hygiene Laboratory was established in New York, at the Marine Hospital on Staten Island, August, 1887. It was transferred to Washington, with quarters in the Butler Building, June 11, 1891, and a new laboratory building, located in Washington, was authorized by act of Congress, March 3, 1901.

The following *bulletins* [Bulls. Nos. 1-7, 1900 to 1902, Hyg. Lab., U. S. Mar.-Hosp. Serv., Wash.] have been issued.

*No. 1.—Preliminary note on the viability of the *Bacillus pestis*. By M. J. Rosenau.

No. 2.—Formalin disinfection of baggage without apparatus. By M. J. Rosenau.

*No. 3.—Sulphur dioxid as a germicidal agent. By H. D. Geddings.

*No. 4.—Viability of the *Bacillus pestis*. By M. J. Rosenau.

No. 5.—An investigation of a pathogenic microbe (*B. typhi murium* Danyz) applied to the destruction of rats. By M. J. Rosenau.

*No. 6.—Disinfection against mosquitoes with formaldehyde and sulphur dioxid. By M. J. Rosenau.

No. 7.—Laboratory technique: Ring test for indol, by S. B. Grubbs and Edward Francis; Collodium sacs, by S. B. Grubbs and Edward Francis; Microphotography with simple apparatus, by H. B. Parker.

By act of Congress approved July 1, 1902, the name of the "United States Marine-Hospital Service" was changed to the "Public Health and Marine-Hospital Service of the United States," and three new divisions were added to the Hygienic Laboratory.

Since the change of name of the service the bulletins of the Hygienic Laboratory have been continued in the same numerical order, as follows:

*No. 8.—Laboratory course in pathology and bacteriology. By M. J. Rosenau, (Revised edition, March, 1904.)

*No. 9.—Presence of tetanus in commercial gelatin. By John F. Anderson.

No. 10.—Report upon the prevalence and geographic distribution of hookworm disease (uncinariasis or anchylostomiasis) in the United States. By Ch. Wardell Stiles.

*No. 11.—An experimental investigation of *Trypanosoma lewisi*. By Edward Francis.

*No. 12.—The bacteriological impurities of vaccine virus; an experimental study. By M. J. Rosenau.

*No. 13.—A statistical study of the intestinal parasites of 500 white male patients at the United States Government Hospital for the Insane; by Philip E. Garrison, Brayton H. Ransom, and Earle C. Stevenson. A parasitic roundworm (*Agamomermis culicis* n. g., n. sp.) in American mosquitoes (*Culex sollicitans*); by Ch. Wardell Stiles. The type species of the cestode genus *Hy-menolepsis*; by Ch. Wardell Stiles.

No. 14.—Spotted fever (tick fever) of the Rocky Mountains; a new disease. By John F. Anderson.

No. 15.—Inefficiency of ferrous sulphate as an antiseptic and germicide. By Allan J. McLaughlin.

*No. 16.—The antiseptic and germicidal properties of glycerin. By M. J. Rosenau.

*No. 17.—Illustrated key to the trematode parasites of man. By Ch. Wardell Stiles.

*No. 18.—An account of the tapeworms of the genus *Hymenolepis* parasitic in man, including reports of several new cases of the dwarf tapeworm (*H. nana*) in the United States. By Brayton H. Ransom.

*No. 19.—A method for inoculating animals with precise amounts. By M. J. Rosenau.

*No. 20.—A zoological investigation into the cause, transmission, and source of Rocky Mountain "spotted fever." By Ch. Wardell Stiles.

No. 21.—The immunity unit for standardizing diphtheria antitoxin (based on Ehrlich's normal serum). Official standard prepared under the act approved July 1, 1902. By M. J. Rosenau.

*No. 22.—Chloride of zinc as a deodorant, antiseptic, and germicide. By T. B. McClintic.

*No. 23.—Changes in the Pharmacopœia of the United States of America. Eighth decennial revision. By Reid Hunt and Murray Galt Motter.

No. 24.—The International Code of Zoological Nomenclature as applied to medicine. By Ch. Wardell Stiles.

No. 25.—Illustrated key to the cestode parasites of man. By Ch. Wardell Stiles.

No. 26.—On the stability of the oxidases and their conduct toward various reagents. The conduct of phenolphthalein in the animal organism. A test for saccharin, and a simple method of distinguishing between cumarin and vanillin. The toxicity of ozone and other oxidizing agents to lipase. The influence of chemical constitution on the lipolytic hydrolysis of ethereal salts. By J. H. Kastle.

No. 27.—The limitations of formaldehyde gas as a disinfectant with special reference to car sanitation. By Thomas B. McClintic.

*No. 28.—A statistical study of the prevalence of intestinal worms in man. By Ch. Wardell Stiles and Philip E. Garrison.

*No. 29.—A study of the cause of sudden death following the injection of horse serum. By M. J. Rosenau and John F. Anderson.

No. 30.—I. Maternal transmission of immunity to diphtheria toxine. II. Maternal transmission of immunity to diphtheria toxine and hypersusceptibility to horse serum in the same animal. By John F. Anderson.

No. 31.—Variations in the peroxidase activity of the blood in health and disease. By Joseph H. Kastle and Harold L. Amoss.

No. 32.—A stomach lesion in guinea pigs caused by diphtheria toxine and its bearing upon experimental gastric ulcer. By M. J. Rosenau and John F. Anderson.

No. 33.—Studies in experimental alcoholism. By Reid Hunt.

No. 34.—I. *Agamoflaria georgiana* n. sp., an apparently new roundworm parasite from the ankle of a negress. II. The zoological characters of the roundworm genus *Filaria* Mueller, 1787. III. Three new American cases of infection of man with horsehair worms (species *Paragordius varius*), with summary of all cases reported to date. By Ch. Wardell Stiles.

*No. 35.—Report on the origin and prevalence of typhoid fever in the District of Columbia. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle. (Including articles contributed by Ch. Wardell Stiles, Joseph Goldgerger, and A. M. Stimson.)

No. 36.—Further studies upon hypersusceptibility and immunity. By M. J. Rosenau and John F. Anderson.

No. 37.—Index-catalogue of medical and veterinary zoology. Subjects: Trematoda and trematode diseases. By Ch. Wardell Stiles and Albert Hassall.

No. 38.—The influence of antitoxin upon post-diphtheritic paralysis. By M. J. Rosenau and John F. Anderson.

No. 39.—The antiseptic and germicidal properties of solutions of formaldehyde and their action upon toxins. By John F. Anderson.

No. 40.—1. The occurrence of a proliferating cestode larva (*Sparganum proliferum*) in man in Florida, by Ch. Wardell Stiles. 2. A reexamination of the type specimen of *Filaria restiformis* Leidy, 1890=*Agamomermis restiformis*, by Ch. Wardell Stiles. 3. Observations on two new parasitic trematode worms: *Homalogaster philippinensis* n. sp., *Agamodistomum nanus* n. sp., by Ch. Wardell Stiles and Joseph Goldberger. 4. A reexamination of the original specimen of *Tania saginata abietina* (Weinland, 1858), by Ch. Wardell Stiles and Joseph Goldberger.

*No. 41.—Milk and its relation to the public health. By various authors.

No. 42.—The thermal death points of pathogenic micro-organisms in milk. By M. J. Rosenau.

No. 43.—The standardization of tetanus antitoxin (an American unit established under authority of the act of July 1, 1902). By M. J. Rosenau and John F. Anderson.

No. 44.—Report No. 2 on the origin and prevalence of typhoid fever in the District of Columbia, 1907. By M. J. Rosenau, L. L. Lumsden, and Joseph H. Kastle.

No. 45.—Further studies upon anaphylaxis. By M. J. Rosenau and John F. Anderson.

No. 46.—*Hepatozoon perniciosum* (n. g., n. sp.); a hæmogregarine pathogenic for white rats; with a description of the sexual cycle in the intermediate host, a mite (*Lelaps echidninus*). By W. W. Miller.

No. 47.—Studies on Thyroid: I. The relation of iodine to the physiological activity of thyroid preparations. By Reid Hunt and Atherton Seidell.

No. 48.—The physiological standardization of digitalis. By Charles Wallis Edmunds and Worth Hale.

No. 49.—Digest of comments on the United States Pharmacopœia. Eighth decennial revision for the period ending December 31, 1905. By Murray Galt Motter and Martin I. Wilbert.

No. 50.—Further studies upon the phenomenon of anaphylaxis. By M. J. Rosenau and John F. Anderson.

No. 51.—Chemical tests for blood. By Joseph H. Kastle.

No. 52.—Report No. 3 on the origin and prevalence of typhoid fever in the District of Columbia. By M. J. Rosenau, L. L. Lumsden, and J. H. Kastle.

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No. 59.—The oxidases and other oxygen catalysts concerned in biological oxidation. By Joseph Hoeling Kastle.

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